Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	CC Docket No. 01-338
Implementation of the Local Competition Provisions of the Telecommunications Act Of 1996	)	CC Docket No. 96-98
Deployment of Wireline Services Offering Advanced Telecommunications Capability	)	CC Docket No. 98-147

COMMENTS OF HIGH TECH BROADBAND COALITION

Business Software Alliance

Consumer Electronics Association

Information Technology Industry Council

National Association of Manufacturers

Semiconductor Industry Association

Telecommunications Industry Association

April 5, 2002

EXECUTIVE SUMMARY

The High Tech Broadband Coalition ("HTBC") represents the leading trade associations of the computer, telecommunications equipment, semiconductor, consumer electronic, software, and manufacturing sectors. HTBC believes the timely deployment of high-bandwidth broadband will generate enormous societal and economic benefits for American consumers, workers, and businesses. However, increasing the availability and speed of broadband services will take significant ongoing investments. In order to reach this goal, the Federal Communications Commission ("Commission") should strive to achieve a minimal regulatory environment for new, last-mile broadband facilities. Specifically, the Commission in this proceeding should refrain from imposing Section 251 unbundling obligations on fiber, remote terminals, and DSL (and successor) electronics deployed on the customer side of the central office used to provide broadband services. At the same time, HTBC believes the Commission must continue to require incumbent local exchange carriers ("ILECs'") to provide collocation space and unbundled access to their legacy copper facilities, as well as establish ILEC build-out percentage and bandwidth requirements.

HTBC believes that freeing the ILECs' new, last-mile broadband facilities from Section 251 unbundling requirements is appropriate for two reasons. First, digital subscriber line ("xDSL") services already face real intermodal competition from cable modem services and emerging competition from satellite and wireless broadband services. These services have experienced or are experiencing rapid growth, which can be attributed largely to the fact that they are subject to minimal or no regulatory obligations. This minimally regulated environment is best suited for promoting intermodal competition. Second, minimizing Section 251 unbundling obligations will serve as a significant economic incentive for ILECs to increase new,

last-mile broadband investment. Without such action by the Commission, further investment, and thus greater access to these services, will be significantly limited.

Under the Telecommunications Act of 1996 ("1996 Act"), the Commission has the authority and obligation to determine that new, last-mile broadband facilities should not be subject to Section 251 unbundling. First, under Section 251(d)(2), competing carriers' ability to provide competitive services is not "impaired" because intermodal alternatives are available and growing. Thus, competitors do not necessarily need access to ILECs' new, last-mile broadband facilities in order to provide a competing broadband service. Second, even if the Commission were to find that impairment exists, the "at a minimum" language of Section 251(d)(2) compels the Commission to consider whether its unbundling rules promote the goals of the 1996 Act. Most importantly, the Commission must consider its obligation under Section 706(a) to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans." Given that the imposition of unbundling requirements on new, speculative facilities discourages investment and consequently limits the number of broadband options for many consumers, the Commission should determine that Section 251 unbundling of ILECs' new, last-mile broadband facilities is not required.

While HTBC supports the minimal regulatory broadband policy for new, last-mile broadband outlined above, it recognizes that these policies must fit into a larger regulatory scheme. To that end, the Commission must continue to require ILECs to provide collocation space in their central offices. Furthermore, competitors must continue to have unbundled access to the legacy copper last-mile facilities to which they have access today. HTBC recognizes that ILECs eventually may not wish to maintain those copper facilities and that it may not make economic sense to require them to do so. Therefore, HTBC also proposes that the Commission

permit ILECs to retire their legacy copper facilities if they enter into voluntary agreements allowing at least one unaffiliated competitive local exchange carrier ("CLEC") access to their broadband facilities, and agreeing to make the access and rates set forth in the agreement available to other similarly-situated CLECs. Under this approach, CLECs would continue to have unbundled access to ILECs' legacy copper facilities and to collocation space in ILECs' central offices at regulated rates or would have access to ILECs' new, last-mile broadband facilities.

Finally, HTBC believes that, as part of this process, the Commission must establish economically rational, provider-specific build-out requirements for the ILECs as to both the percentage of customers served and the bandwidth speeds provided to those customers. Requiring ILECs to meet reasonable yet significant benchmarks will foster competition in the next generation of broadband services and enable broadband to reach its critical mass in a foreseeable and reliable manner.

HTBC's members have a strong interest in advocating public policies that promote broadband deployment in a manner congruent with those of consumers. Both the industries HTBC represents and consumers want broadband to be widespread, high bandwidth, and affordable. After careful deliberation, HTBC believes that the public interest will best be served by the Commission refraining from imposing Section 251 unbundling regulation on ILECs' new, last-mile broadband facilities.

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COMMENTS OF HIGH TECH BROADBAND COALITION

The High Tech Broadband Coalition ("HTBC") hereby submits the following comments in response to the *Notice of Proposed Rulemaking* ("*NPRM*") released in the above-captioned proceeding concerning the Federal Communications Commission's ("FCC" or "Commission") unbundling rules.[1] HTBC is composed of six trade organizations whose members represent a wide range of high-tech companies. HTBC's members include the leading trade associations of the computer, telecommunications equipment, semiconductor, consumer electronic, software, and manufacturing sectors.

[1] *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Service Offering Advanced Telecommunications Capability,* Notice of Proposed Rulemaking, CC Docket Nos. 01-338, 96-98, 98-147, FCC 01-361 (rel. Dec. 20, 2001) ("*NPRM*").

These members are:

- The Business Software Alliance ("BSA") is an international organization representing leading software and e-commerce developers in 65 countries around the world.

- The Consumer Electronics Association ("CEA") represents companies that lead the consumer electronics industry in the development, manufacturing, and distribution of audio, video, mobile electronics, communications, information technology, multimedia, and accessory products, as well as related services, which are sold through consumer channels. More than 1,000 member companies generate more than $90 billion in annual factory sales. The average American family spends over $1,000 each year on CEA's member products.

- The Information Technology Industry Council ("ITI") represents the world's leading providers of information technology products and services, including computer, networking, data storage, communications, and Internet equipment, software, and services. In 2000, ITI member companies employed more than one million people in the United States and exceeded $668 billion in worldwide revenues.

- The National Association of Manufacturers ("NAM") is the nation's largest industrial trade association. NAM represents 14,000 members (including 10,000 small and mid-sized companies) and 350 member associations serving manufacturers and employees in every industrial sector and all 50 states.

- The Semiconductor Industry Association ("SIA") is the premier trade association representing the $102 billion United States microchip industry. SIA member companies comprise more than 90 percent of U.S.-based semiconductor production.

- The Telecommunications Industry Association ("TIA") is the leading trade association serving the communications and information technology industry, with proven strengths in market development, trade shows, domestic and international advocacy, standards development, and enabling e-business. Through its worldwide activities, the association facilitates business development opportunities and a competitive market environment. The association provides a market-focused forum for its more than 1,100 member companies that manufacture or supply the products and services used in global communications. TIA represents the communications sector of the Electronic Industries Alliance ("EIA").

I. INTRODUCTION AND HTBC PROPOSAL.

HTBC commends the Commission for adopting this *NPRM* and considering updated Section 251 unbundling rules based upon the technological advances and marketplace changes that have occurred since the *UNE Remand Order* in 1999.[2] HTBC's goal is widespread, affordable, and high-bandwidth broadband access that will enable all Americans to experience the full potential of the Internet and the information technology revolution. HTBC does not endorse or advocate any single broadband technology or business sector. Rather, it believes that strong facilities-based intermodal competition will best serve consumers' interests. The trade associations that comprise HTBC represent member companies running the gamut of the high-technology industry—companies whose continued success is increasingly reliant upon consumer adoption of broadband. Therefore, like consumers, HTBC wants broadband service to be affordable, widespread, and high bandwidth.

HTBC is acutely interested in the adoption of public policies that promote broadband deployment and competition. HTBC believes that consumers will benefit substantially from the deployment of multiple, competing facilities-based broadband technologies, including cable modem, digital subscriber line ("xDSL"), satellite, fixed wireless, mobile wireless, fiber-to-the-home, and others. Minimal regulation of these broadband technologies will promote rapid deployment of broadband technology and innovation in broadband applications. Accordingly, HTBC favors a minimally regulated environment for incumbent local exchange carriers'

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[2] *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, 15 FCC Rcd 3696 (1999) ("*UNE Remand Order*").

("ILECs'") new, last-mile broadband facilities[3] because it will maximize the potential for affordable broadband services and capabilities, and for consumer choice.[4]

Specifically, HTBC recommends that the Commission not apply Section 251 unbundling obligations to ILECs' new, last-mile broadband facilities. HTBC urges the Commission to define these facilities to include fiber, remote terminals, and DSL (and successor) electronics deployed on the customer side of the central office used to provide broadband services. Further, recognizing that ILECs eventually may not wish to maintain their copper facilities, HTBC also proposes that the FCC permit ILECs to retire their legacy copper facilities if they enter into voluntary agreements with at least one unaffiliated competitive local exchange carrier ("CLEC") regarding access to their new, last-mile broadband facilities and agree to make the access and rates set forth in such agreements available on a nondiscriminatory basis to other similarly-situated CLECs. Under this approach, CLECs would continue to have unbundled access to ILECs' legacy copper facilities and to collocation space in ILECs' central offices at regulated rates or would have access to ILECs' new, last-mile broadband facilities. Finally, in adopting

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[3] Throughout these comments, the term "new, last-mile broadband facilities" means fiber, remote terminals, and DSL (and successor) electronics deployed on the customer side of the central office used to provide broadband services.

[4] The Commission has stated that "broadband services should exist in a minimally regulated environment that promotes investment and innovation in a competitive market." *See Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer III and ONA Safeguards and Requirements*, Notice of Proposed Rulemaking, CC Docket Nos. 02-33, 95-20, 98-10, FCC 02-42, ¶ 5 (rel. Feb. 15, 2002) ("*Wireline Broadband NPRM*").

this proposal, the Commission should set schedules or "benchmarks" for ILEC broadband deployment that are aggressive, attainable and economically rational.

II. BROADBAND HOLDS GREAT PROMISE FOR U.S. RESIDENTS AND THE ECONOMY, BUT WILL REQUIRE SIGNIFICANT DEPLOYMENT OF NEW FACILITIES.

Both the United States Congress and the Commission have recognized the importance of broadband. In Section 706 of the Telecommunications Act of 1996 Act ("1996 Act"), [5] Congress directed the Commission to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans."[6] If the agency finds that such capability is not being deployed in a reasonable and timely fashion, Congress mandated that the FCC "take immediate action to accelerate deployment of such capability" by, among other things, "regulatory forbearance" and "removing barriers to infrastructure investment."[7] Commenting on the value of broadband, Chairman Powell recently noted that "the importance of broadband deployment to the public interest and welfare is too great to disregard any potential method of facilitating that deployment."[8]

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5 Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996) ("1996 Act").

6 1996 Act, Title VII § 706, reproduced in the notes under 47 U.S.C. § 157.

7 *Id*. Section 706 defines "advanced telecommunications capability" "without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology." *Id*.

8 *Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Notice of Proposed Rulemaking, CC Docket No. 01-337, FCC 01-360 (rel. Dec. 20, 2001) (Separate Statement of Michael K. Powell).

A. Ubiquitous Broadband Availability Offers Many Significant Benefits For Our Nation's Residents.

Widespread broadband adoption has the potential to transform the way we live, learn, work, and play. In particular, broadband presents enormous opportunities in telemedicine, distance learning, e-government, telecommuting, e-commerce, and entertainment. For example, through the use of wearable sensors, digital cameras, and video imagery over broadband connections, patients may obtain a physician's diagnosis online, obviating the need for unnecessary and time-consuming trips to the doctor's office.[9] Further, students will be able to access real-time video feeds of instructor lessons or obtain extracurricular instructional material using broadband access to software on school computers. This will create a more efficient and effective learning environment and permit children who are not able to attend class in person to keep up with studies.[10]

Broadband also will enable key improvements in consumer applications. In particular, consumers will benefit from integration of voice, video, and data environments. This type of integration will foster important functionality, such as: (1) real-time, interactive personal responses to customers; (2) pictorial, graphical, and transactional displays; (3) virtual reality—making the shopping experience more like that in a physical store; and (4) Internet appliances in

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[9] Anick Jesdanun, *Will Speedy Connections Improve Life?*, Yahoo! News (Mar. 11, 2002) http://story.news.yahoo.com/news?tmpl=story&u=/ap/20020311/ap_on_hi_te/broadband_promise_3 (last visited Apr. 4, 2002).

[10] *See Id*. Distance learning initiatives will result in profound societal impacts because distance learning "represents a key means for advancing education at every academic level, and for enabling lifelong learning." *See* Report of the National Broadband Task Force, *The New National Dream: Networking the Nation for Broadband Access*, at 26 (2001) (*"Broadband Task Force Report"*) available at http://broadband.gc.ca/english/broadband.pdf.

cars, homes, kitchen appliances, transportation systems, and vending machines.[11] The combination of broadband access and network-aware products, such as medical devices, appliances, radios, clocks, and heating and cooling units, will result in efficiencies like remote access and activation of security systems, lighting, and heat, as well as remote programming of VCRs and other home appliances.[12] Moreover, these network-aware products will result in important benefits not yet foreseen.[13] Ubiquitous broadband networks are necessary to handle the growing demand for bandwidth that these and other applications will generate.[14]

The Canadian National Broadband Task Force's recent report on deploying broadband in Canada describes additional societal benefits resulting from broadband adoption.[15] For example, the Canadian Hearing Society is initiating several projects using broadband to support educational, employment, and communication opportunities for the hearing impaired and blind.[16] In addition, the Broadband Task Force Report notes that broadband will create a more accessible political system, improving "delivery of public services, and [sic] the relationship between government, the private sector and civil society."[17] E-government initiatives through broadband

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11 *Broadband Task Force Report* at 23.

12 *See* Jesdanun, *supra* note 9.

13 See Robert W. Crandall and Charles L. Jackson, Criterion Economics LLC, *The $500 Billion Opportunity: Benefits of Widespread Diffusion of Broadband Internet Access*, at 13 (July 2001) (*"The $500 Billion Opportunity"*).

14 *Broadband Task Force Report* at 23.

15 *Broadband Task Force Report* at 19-31.

16 *Broadband Task Force Report* at 20.

17 *Broadband Task Force Report* at 20.

could also benefit U.S. residents through increased contact with officials and greater awareness of government actions, ultimately making government more accountable.

Additional unanticipated benefits are just around the corner. Indeed, the benefits of technology have often been elusive targets. For example, no one forecast the possibilities of the modern spreadsheet, email, or the World Wide Web.[18] It is likely that ubiquitous broadband deployment will lead to similar, revolutionary innovations.

B. Widespread Broadband Deployment Will Invigorate Our Nation's Economy.

Broadband deployment is also a catalyst for strengthening and improving the U.S. economy.[19] Consumers and producers, employees and shareholders, as well as U.S. competitiveness generally, will benefit greatly from broadband.[20] A recent economic impact study of broadband by Drs. Robert E. Crandall and Charles L. Jackson estimates that the universal adoption of broadband Internet access could provide U.S. consumers economic benefits ranging from $200 billion to $400 billion per year.[21]

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18 *The $500 Billion Opportunity* at 13.

19 *See, e.g.*, Letter to the Honorable George W. Bush, President, United States of America, from Matthew J. Flanigan, President, Telecommunications Industry Association (Oct. 4, 2001) ("timely adoption of a national broadband deployment policy … would contribute significantly to an early return to strength of the national economy").

20 *See generally The $500 Billion Opportunity.*

21 *The $500 Billion Opportunity* at 2. This study also found that accelerating broadband deployment would provide increased economic benefits. In particular, a faster acceleration of ubiquitous broadband availability is worth $500 billion to U.S. consumers and producers. *Id*. at 54.

The sectors likely to be affected by broadband are numerous, and even small improvements in these areas as a result of broadband adoption will generate enormous annual savings.[22] One report predicts that companies in 26 industry segments can "save an estimated $223 billion using [collaborative] commerce solutions through 2005."[23] Further, widespread broadband deployment would serve as a significant stimulus to information technology ("IT") investment, which, in turn, will bolster economic growth. The IT sector has been the engine of economic growth in the U.S. in recent years.[24] It accounted for nearly 30 percent of real GDP growth from 1996 to 2001 and, as early as 2000, IT occupations employed over 6.65 million workers at more than double the average private sector wage.[25] In 2001, falling investment in

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[22] *The $500 Billion Opportunity* at 27-33.

[23] *The Collaborative Commerce Value Statement: A $233 Billion Cost Savings Opportunity Over Six Years*, Module B-to-B Commerce and Applications, Vol. 6.6, Yankee Group (June 14, 2001). The industry segments analyzed include food manufacturing, beverage and tobacco product manufacturing, textile mills, textile product mills, apparel manufacturing, leather and allied product manufacturing, wood product manufacturing, paper manufacturing, printing and related support activities, petroleum and coal products manufacturing, chemical manufacturing, plastics and rubber products manufacturing, nonmetallic mineral product manufacturing, primary metal manufacturing, fabricated metal product manufacturing, machinery manufacturing, computer and electronic product manufacturing, electrical equipment, appliance, and component manufacturing, transportation equipment manufacturing, furniture and related product manufacturing, miscellaneous manufacturing, mining, merchant wholesale durable, merchant wholesale non-durable, retail, and construction.

[24] U.S. Department of Commerce, Economics and Statistics Administration, *Digital Economy 2000*, Executive Summary (June 2000) (noting that "[t]he vitality of the digital economy is grounded in IT-producing industries—the firms that supply the goods and services that support IT-enabled business processes, the Internet and e-commerce"). http://www.esa.doc.gov/de2k.htm.

[25] U.S. Department of Commerce, Economics and Statistics Administration, *Digital Economy 2002*, at 42-44 (Feb. 2002).

information processing equipment and software lowered economic growth significantly.[26] Greater broadband deployment will stimulate investment in this area so that this sector again serves as an engine for growth.

In addition, greater availability of broadband could benefit manufacturers of networking equipment, personal computers, ancillary network equipment and software, and producers and distributors of entertainment products by as much as $100 billion annually.[27] Strengthening and increasing labor productivity growth (*i.e.*, output per labor hour) is perhaps the most important economic benefit of broadband deployment. IT use and production have been credited with generating one-half to three-quarters of the acceleration in U.S. labor productivity growth since 1995.[28] This acceleration in productivity growth was achieved at a time of massive investment in IT equipment and software.[29] Productivity growth was bolstered as businesses were rapidly upgrading to faster, more powerful equipment, which decreased the amount of labor time needed

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[26] From 1995 through 2000, gross private domestic investment in information processing equipment and software contributed, on average, 0.73 percentage points to real GDP growth. *See* U.S. Department of Commerce, Bureau of Economic Analysis, National Income Product Accounts Tables, *Table 8.2: Contributions to Percent Change in Real Gross Domestic Product* http://www.bea.doc.gov/bea/dn/nipaweb/TableViewFixed.asp#Mid.

[27] The $500 Billion Opportunity at 2.

[28] Council of Economic Advisers, Economic Report of the President, at 32 (Jan. 2001); Karl Whelan, Federal Reserve Board, *Computers, Obsolescence and Productivity*, at 25 (Feb. 2000); Stephen Oliner and Dan Sichel, Federal Reserve Board, *The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?* at 2 (May 2000); Congressional Budget Office, *The Budget and Economic Outlook*, *Fiscal Years 2001-2010*, Section 4 of 14 and Appendix A (Jan. 2000); Dale W. Jorgensen and Kevin J. Stiroh, Federal Reserve Bank of New York, *Raising the Speed Limit: U.S. Economic Growth in the Information Age*, at 2-8 (May 1, 2000).

[29] U.S. Department of Commerce, Bureau of Economic Analysis, National Income Product Accounts Tables, *Table 8.2: Contributions to Percent Change in Real Gross Domestic Product* http://www.bea.doc.gov/bea/dn/nipaweb/TableViewFixed.asp#Mid.

to perform operations.[30] In 2001, such investment fell dramatically as businesses failed to upgrade to faster machines. Faster networks made available through broadband deployment are needed to offset the effect of slumping investment.

Broadband also allows for more accurate inventory management. Increased oversight over inventory, production, and demand holds the promise of reducing the length and severity of recessions by minimizing the lag time between a drop in demand and a corresponding drop in production. This allows companies to adjust their production levels more quickly, which serves to avoid an inventory buildup that then necessitates layoffs while that inventory is dwindled down. Conversely, greater supply-chain management allows companies to increase production and employment more rapidly in the face of strong demand. The Canadian Broadband Task Force also found that "the economic benefits of e-business will eventually pervade the entire economy" and include improved market and organizational efficiency, more rapid innovation, lowered entry barriers, reduced distribution and procurement costs, accelerated outsourcing, virtualization, and productivity improvements.[31]

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[30] *Id*. Increased security costs also threaten continued strength in productivity growth. Travel delays and the cost of greater security technology and personnel all add cost to production without increasing output. The ability of broadband to lower the labor time necessary to perform tasks, while increasing the utility of videoconferencing to avoid travel delays, will serve as an important counterweight to the diminishing effects on productivity growth that increased security may have. The importance of maintaining accelerated productivity growth rates cannot be overstated. For example, over $500 billion of anticipated Federal revenues over the next decade depends on the productivity growth effects of IT use and production. *See Economic Benefits of IT Account for $515 Billion of Anticipated Revenues Over Next Decade*, Information Technology Industry Council, available at http://www.itic.org/policy/tax_revenues.htm.

[31] *Broadband Task Force Report* at 23-24.

Finally, widespread broadband deployment will create more highly skilled jobs in the United States. According to a New Millennium Research Council study, building and using a nationwide broadband network will create an estimated 1.2 million new and permanent high-skilled jobs.[32] The New Millennium report also estimates that such a network would generate about $35 billion annually in investment.[33] Michigan Governor John Engler has stated that jumpstarting high-speed broadband Internet access service throughout the state of Michigan will help create an estimated 500,000 jobs in Michigan alone.[34]

C. The Real Benefits Of Broadband Will Increase With Each Successive Generation Of The Technology.

While current generation broadband is exciting, next generation broadband holds even more promise.[35] Bandwidth will increase substantially, by an order of magnitude over current

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[32] Stephen B. Pociask, *Building a Nationwide Broadband Network: Speeding Job Growth*, New Millennium Research Council, at 7 (Feb. 25, 2002) http://www.newmillenniumresearch.org/event-02-25-2002/jobspaper.pdf.

[33] *Id*. at 5.

[34] *Engler Proposes Broadband Jumpstart to Help Spur Michigan's Economy*, Press Release, The Office of the Governor (Nov. 2, 2001) http://www.michigan.gov/gov/1,1431,7-103-703-4779--M,00.html.

[35] There are several ways to categorize the various levels of broadband capability, which highlight the distinctions between current generation and next-generation broadband services and technology. ITI has categorized the term "current generation" broadband to include the vast majority of broadband services available to consumers today, which generally are configured to provide speeds up to 1.5 megabits per second ("Mbps") with typical speeds much slower. By contrast, the term "next-generation" broadband is used to refer to those technologies such as Fiber-to-the-User generally not available in today's market, which are capable of delivering far greater speeds of over 100 Mbps or more. *See* Comments of the Information Technology Industry Council, *Request for Comments on Deployment of Broadband Networks and Advanced Telecommunications*, NTIA Docket No. 011109273-1273-01, at 2 (filed Dec. 19, 2001).

broadband offerings.[36] These higher speeds are needed to support increasingly bandwidth-intensive applications in the fields of telemedicine, distance learning, e-government, e-commerce, telecommuting, and online entertainment.[37]

Current broadband offerings, such as xDSL technology, provide many benefits but are constrained by distance and other technical limitations that prevent them from being deployed to all potential end users without significant access and network equipment additions and upgrades. In particular, xDSL is sensitive to the distance that a transmission must travel between an end-user location and a carrier's central office. Asymmetric DSL service, the most popular residential offering,[38] is currently offered only to consumers within 18,000 feet of a carrier's

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[36] *See, e.g.*, Reply Comments of the Telecommunications Industry Association, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, CC Docket No. 98-146, ¶ 9 (filed Oct. 9, 2001) ("*TIA Section 706 Reply Comments*") ("Even 10 Mbps connections will not be the stopping point, as next-generation technologies continue to expand what is feasible, both technically and economically.").

[37] According to the Cross Industry Working Team ("XIWT"), networked multimedia applications ("NMAs"), in particular, require large-scale infrastructure deployment. NMAs employ a variety of information technologies to make motion and still pictures, richly formatted text and hypertext, sound and data available to information appliances over the Internet. *See* XIWT, *Class Profiles for the Current and Emerging NII* (Feb. 1997) http://www.xiwt.org/documents/ClassProfiles.html#Section2.0 ("*XIWT Class Profiles*").

[38] See *Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, Internet Over Cable Declaratory Ruling, Appropriate Regulatory Treatment for Broadband Access to the Internet over Cable Facilities*, Declaratory Ruling and Notice of Proposed Rulemaking, GN Docket No. 00-185, CS Docket No. 02-52, FCC 02-77, at n. 27 (Mar. 15, 2002) ("*Cable Modem Service Declaratory Ruling and NPRM*"); *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable And Timely Fashion, and Possible Steps To Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Third Report, CC Docket No. 98-146, FCC 02-33, ¶¶ 25, 48 (Feb. 6, 2002) ("*Third Advanced Services Report*").

central office.[39] As a result, xDSL is available only to 43 percent of total customer locations.[40] Even for those locations for which xDSL distance limitations are not a factor, other technical limitations exist. For example, xDSL is incompatible with most currently deployed digital loop carrier ("DLC") technology and cannot be provided where legacy DLCs are used, including a large part of the southern United States.[41] These limitations can be overcome, however, by the deployment of Next Generation Digital Loop Carriers ("NGDLCs") in new remote terminals or through the upgrade of existing DLCs to NGDLCs but this is an expensive network enhancement.[42]

Further, those consumers able to obtain DSL service must contend with the speed limitations inherent in current DSL offerings. While asymmetric DSL may be available at a maximum transmission speed of 8 megabits per second ("Mbps") downstream and 640 kilobits

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[39] The Commission has recently indicated that a few DSL extension products may make some versions of DSL available to customers more than 18,000 feet from a carrier's central office. However, carriers must deploy new and costly equipment to reach these customers. *See Third Advanced Services Report*, ¶ 84.

[40] Salomon Smith Barney, *The Battle for the High-Speed Data Subscriber: Cable vs. DSL*, at 2 (Aug. 20, 2001).

[41] *Deployment of Advanced Telecommunications Capability to All Americans in a Reasonably and Timely Fashion and Possible Steps To Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Second Report, 15 FCC Rcd 20913, 20932 ("*Second Advanced Services Report*"). See also, Jerry A. Hausman et al., *Cable Modems and DSL: Broadband Internet Access for Residential Customers*, American Economic Association Papers and Proceedings, Vol. 91 No. 2, at 302, 304 (2001) available at http://papers.ssrn.com/sol3/delivery.cfm/SSRN_ID296375_code020109140.pdf?abstractid=296375.

[42] Comments of SBC Communications, Inc., *Request for Comments on Deployment of Broadband Networks and Advanced Telecommunications Services*, NTIA Docket No. 011109273-1273-01, at 4 (filed Dec, 19, 2001).

per second ("Kbps") upstream,[43] due to network design and capacity constraints, the vast majority of xDSL end-users today only have access to a maximum downstream transmission speed of 1.544 Mbps.[44] As a result of these combined factors, the majority of U.S. consumers cannot obtain current xDSL service, and those who can obtain it can only do so at limited speeds.[45]

Moreover, currently available broadband services are sometimes insufficient to exploit the full potential of broadband. According to the National Research Council, "there is a significant gap between the capabilities of current broadband services and some of the cutting-edge applications that have been touted but are not generally available to the public."[46] A major

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43 *Cable Modem Service Declaratory Ruling and NPRM*, at n. 27.

44 Computer Science and Telecommunications Board, National Research Council, *Broadband Bringing Home the Bits* 126 (2002) ("*Bringing Home the Bits*"). The National Research Council's Computer Science and Telecommunications Board, Committee on Last Mile Technology, recently completed this report, which is the result of a two-year study of broadband deployment and consumer demand.

45 The new G.SHDSL standard for symmetric DSL permits speeds of up to 2.3 Mbps. *See Third Advanced Services Report*, ¶ 84; Jim Thompson, *G.SHDSL: New and Improved DSL*, ISP-Planet (June 19, 2001) available at http://www.isp-planet.com/technology/dsl/gshdsl.html. However, to be implemented properly, G.SHDSL requires installation of new equipment such as line cards. *See* Paula Bernier, *A New Standard for DSLA: ITU Expected to Approve G.SHDSL This Month* available at http://www.xchangemag.com/articles/121feat1a.html (Feb. 2001). In addition, this technology will be targeted at business customers and will not be used by residential customers. *Id*.; Corey Grice and Sam Ames, *New DSL standard offers faster speeds* (Sept. 2001) available at http://news.com.com/2100-1033-273311.html?legacy=cnet.

46 *Bringing Home the Bits* at 13.

hurdle for current generations of broadband is the ability to deliver high quality video.[47] For example, video-on-demand provider Intertainer, Inc. recently noted that it turns away 50 percent of its potential customers because their broadband connections lack the required minimum sustained bandwidth of 500 Kbps needed to deliver a movie.[48] While a 2 to 5 Mbps connection may be enough bandwidth for many of today's applications, it will almost be inadequate for the future.[49] Consumers need nearly 4 Mbps of bandwidth per channel to receive a DVD quality picture,[50] and about 19.4 Mbps per channel to obtain high-definition television ("HDTV").[51]

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[47] The XIWT member companies delineated a set of core capabilities needed to support effective networked multimedia applications. Using these classifications, XIWT proposes five National Information Infrastructure ("NII") designations or classes. The five different classes of service are as follows: Class 1 – 10 Kbps to 100 Kbps; Class 2 – 100 Kbps to 1 Mbps; Class 3 – 1 Mbps to 10 Mbps; Class 4 – 10 Mbps to 100 Mbps; and Class 5 – 100 Mbps to 1 Gbps. *See,* XIWT, *Class Profiles For The Current and Emerging NII* (Feb. 1997) available at http://www.xiwt.org/documents/ClassProfiles.html#Section2.0 (*"XIWT Class Profiles"*). These class distinctions can be further refined as "current generation" (Classes 1-3) and "next generation" (Class 4), and "future generation" (Class 5). The XIWT Class Profiles place video broadcast and high quality imaging in Classes 4 and 5, meaning that these applications require broadband speeds above 10 Mbps. *See id.* Further, according to XIWT, video on demand, remote LAN access, videoconference and interactive games are in Classes 3-4, which require speeds in excess of 1 Mbps.

[48] Sue Zeidler, *Experts: Broadband Not Ready for Hollywood* (Feb. 3, 2002) http://story.news.yahoo.com/news?tmpl=story&cid=582&u=/nm/20020203/wr_nm/media_broadband_dc_.

[49] *Bringing Home the Bits* at 65.

[50] Greene, Kira, *Coming Eventually: TV on the PC*, Broadcasting and Cable (Dec. 11, 2000) http://www.tvinsite.com/broadcastingcable/index.asp?layout=print_page&doc_id=&articleID=CA54862.

[51] Albiniak, Paige, *Broadband Tug O War*, Broadcasting and Cable (Jan. 28, 2002) http://www.tvinsite.com/broadcastingcable/index.asp?layout=print_page&doc_id=&articleID=CA193174. *See also 100 Mbps and Beyond: Bringing Consumers High-Speed Access*, Consumer Electronics Association at 4 (Aug. 2001) (*"CEA Report"*) ("Broadcasting high-definition signals may require as much as 20 Mbps.").

D. Consumers Will See The Benefits Of Broadband Once Facilities Capable Of Providing Such Services Reach A Critical Mass Of Households.

High tech markets with strong complementarities between hardware and applications often exhibit bandwagon effects.[52] These markets present the classic "chicken and the egg" conundrum: a new application will not be made available until a sufficient number of users have the capability (*i.e.*, a broadband connection) to support the application; however, without the new application, users do not desire the capability.[53] As Dr. Jeffrey Rohlfs explains in *Bandwagon Effects in High Technology Industries*, bandwagon markets "have dynamics that differ from those of conventional products and services. They are quite difficult to get started and often end up in a ditch before they can get underway."[54]

Bandwagon markets (or markets subject to external demand-side economies of scale)[55] only realize momentum when a critical mass of users is reached—and until such critical mass is achieved, those markets cannot be successful.[56] Accordingly, solving the start-up problem

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52 *See generally* Rohlfs, Jeffrey H., *Bandwagon Effects in High-Tech Industries* (2001) ("*Bandwagon Effects*").

53 *Bringing Home the Bits* at 2; Strategic Policy Research, *The Disincentives for Broadband Deployment Afforded by the FCC's Unbundling Policies*, § 5.3 (Apr. 4, 2002) ("*Haring-Rohlfs Study*") (attached hereto); Jared Sandberg, *Broadband's Chicken and Egg Bind: What's Delaying Web's Promise? Media World Cites Networks, Networks Cite Lack of Media*, Wall Street Journal (Apr. 2, 2001) at B1.

54 *Bandwagon Effects* at 4.

55 Where bandwagon effects apply to networks, they are often called network externalities. *Id*. at 55.

56 *Id*. at 56.

inherent in bandwagon markets requires reaching a critical mass of users.[57] The National Research Council has noted: "[o]nce a mass market is achieved—which brings with it prospects of new applications and business opportunities—there is a likelihood that demand and willingness to pay will increase."[58] Put another way, once enough users join the bandwagon and the market reaches a critical mass of users, demand becomes subject to positive feedback.[59] As a result, growth in demand in itself leads to further increases in demand.[60]

According to Dr. Rohlfs, many high-technology products and services, including facsimile machines, compact disks ("CDs"), televisions, VCRs, personal computers and the Internet, have experienced start-up problems and "bandwagon effects."[61] For example, while CDs represented an immense product advance in recorded music, they also faced significant "chicken and egg" start-up problems.[62] Specifically, there would have been little or no demand for CD players if offered before CDs, and there would have been little or no demand for CDs if they were offered before CD players.[63] Additionally, neither the CD player nor CDs would have

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57 *Id*.

58 *Bringing Home the Bits* at 25.

59 *Bandwagon Effects* at 27. Positive feedback describes a process by which increases in an activity lead to further increases in an activity, which lead to still further increases in that activity, and so on. *Id.*

60 *Bandwagon Effects* at 56.

61 *Bandwagon Effects* at 3-6.

62 *Bandwagon Effects* at 91, 95.

63 *Id*.

been valuable to consumers without content on the CDs (*i.e.*, music).[64] The more consumers purchased CDs and CD players, the more willing record companies were to develop and distribute recorded music on CDs.[65] Thus, CDs became more valuable to each consumer as more consumers purchased CD players and CDs.

The same bandwagon effect applies to broadband. The lack of availability of broadband applications cited by some does not stem from lack of consumer demand, but rather from a "chicken and egg" problem.[66] The Commission itself has acknowledged that broadband exhibits the characteristics of a bandwagon market: "a variety of factors…may be relevant to the overall subscription rate for advanced services, including: computer ownership, cost, the lack of applications which require advanced telecommunications capability, and marketing techniques."[67]

Because broadband is a bandwagon market, the gap between passby rates (supply) and penetration rates (demand) may be a misleading indicator of whether the broadband market is developing adequately.[68] The lack of availability of broadband applications cited by some may

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64 *Id*. at 95-96.

65 *Id*.

66 *Bringing Home the Bits* at 115 (noting that "[w]ithout a mass market of consumers with broadband access, it is hard to develop a business model that justifies investment in new content (or translating old content);" *see also Haring-Rohlfs Study*, *supra* note 53, § 5.3.

67 *Third Advanced Services Report*, ¶ 7.

68 The Commission's *Third Advanced Services Report* also recognized that current consumer demand figures for broadband do not capture the nature of the broadband problem indicating that "it is appropriate to emphasize availability [of advanced services] because we do not believe that adoption rates should necessarily drive government responses.)" *Id*., ¶ 5.

not stem from lack of consumer demand, but rather from a failure of the market to reach critical mass. Without more broadband applications, some consumers believe that the price of broadband does not merit the cost, and, thus, do not purchase broadband connections.[69] Because there are not enough consumers with broadband connections, companies do not develop additional broadband applications that would attract new subscribers.[70]

On the other hand, as with most bandwagon markets, broadband will rapidly gain momentum when facilities capable of providing broadband services reach a critical mass of customers. According to the Commission, "analysts predict that new and unforeseen capacity hungry applications that require advanced service platforms will drive demand, and in turn deployment in the future."[71] For example, once broadband services are available to large numbers of consumers, broadband service providers will have greater incentives to innovate and improve their service, which, in turn, will provide other companies with greater incentive to develop broadband applications, such as those supporting real-time video communications. Thus, when broadband reaches its critical mass, a powerful bandwagon will begin rolling whose benefits we can now only dimly perceive.

In sum, because consumers will only begin to experience positive bandwagon effects in the broadband market when facilities capable of supporting broadband applications reach a critical mass of customers, regulators should design unbundling and other regulatory policies that

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69 Indeed, "[m]any consumers (67 percent) have never experienced a high-speed connection. Without having tried it, these users are unaware of what high-speed access can offer." *CEA Report* at 8.

70 *Haring-Rohlfs Study*, *supra* note 53, § 5.3.

71 *Third Advanced Services Report*, ¶ 64.

promote deployment of broadband facilities. Such policies will help spur the development of new and innovative applications and create new demand for these applications to the benefit of all broadband subscribers.

III. XDSL FACES COMPETITION IN THE MARKETPLACE FOR BROADBAND SERVICES.

Broadband service, not xDSL service or even wireline service, is the relevant market for determining the state of competition and appropriate regulatory policies. The FCC has acknowledged this on numerous occasions. For example, in analyzing the competitive effects of the merger of America Online and Time Warner, the Commission examined the market for "high-speed Internet access service," and noted that such service "is available through several different technologies, including cable, [xDSL], fixed terrestrial wireless, and satellite."[72] Further, in its Eighth Annual Report on Video Competition, the Commission stated that "[b]roadband technologies include cable broadband, telephone company [xDSL], broadband wireless, and broadband satellite."[73] Finally, in the recently released *Wireline Broadband NPRM* and *Cable Modem Service Declaratory Ruling and NPRM*, the Commission observes that

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[72] *Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations by Time Warner Inc. and America Online, Inc., Transferors, to AOL Time Warner Inc., Transferee*, Memorandum Opinion and Order, CS Docket No. 00-30, FCC 01-12, ¶ 63 (rel. Jan. 22, 2001) ("*AOL Time Warner Order*").

[73] *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Eighth Annual Report, CS Docket No. 01-129, FCC 01-389, at n. 126 (rel. Jan. 14, 2002).

broadband is evolving across multiple electronic platforms, including wireline, cable, terrestrial wireless, and satellite.[74]

In the market for broadband service, xDSL faces competition from cable modem service, the current market leader, as well as emerging competition from new satellite and wireless services.[75] As of December 31, 2001, cable modem service was available to more than 70 million homes[76] and xDSL service was available to 45 to 50 million homes.[77] On that date, there were 7.2 million cable modem subscribers and about 3.5 million xDSL subscribers.[78] Thus, at the end of 2001, cable broadband had a 2 to 1 advantage over xDSL in terms of market penetration. This advantage is not surprising, as cable has lower capital expenditures with

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[74] *Wireline Broadband NPRM*, ¶ 4; *Cable Modem Service Declaratory Ruling and NPRM*, ¶ 6.

[75] With respect to the newer fixed wireless and satellite broadband technologies, the Commission has acknowledged that "emerging technologies continue to stimulate competition and create new alternatives and choices for consumers." *See Third Advanced Services Report*, ¶¶ 3, 7.

[76] *Industry Statistics*, http://www.ncta.com/industry_overview/indStat.cfm?indOverviewID=2 (last visited Apr. 4, 2002).

[77] Dina Bass, *Microsoft Delays Expanding Fast Net Service*, Bloomberg News (Jan. 31, 2002). http://archives.seattletimes.nwsource.com/cgi-bin/texis.cgi/web/vortex/display?slug=microsoft31&date=20020131&query=Microsoft+Delays+Expanding+

[78] *Cable Modem Market Stats & Projections*, http://www.cabledatacomnews.com/cmic/cmic16.html (last visited Apr. 4, 2002).

respect to provision of broadband services than xDSL.[79] Indeed, JP Morgan and McKinsey & Company report that at no point during the next three years will the average cost of providing xDSL service be less than the average cost of providing cable modem service.[80] Further, two-way satellite broadband services, only recently made available, likely will provide additional competition to xDSL and cable given satellite's national footprint and ability to deliver broadband service to geographically remote areas. Two-way satellite broadband is now available with speeds up to 400 Kbps downstream and up to 128 Kbps upstream.[81] Next-generation satellite broadband will offer speeds up to 30 Mbps downstream and between 512 Kbps and 10 Mbps upstream.[82] Likewise, MMDS and LMDS fixed wireless systems currently are deploying services that offer data speeds up to 11 Mbps.[83] To date, the availability of these

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79 This stems from the fact that "the costs of a cable plant upgrade are shared" across a number of revenue streams and, thus, "the dedicated capital expenditures for providing cable modem service are relatively modest." Salomon Smith Barney, *supra* note 40, at 5. In contrast, regional Bell operating company ("RBOC") expenditures to put fiber deep into the network, eliminate digital loop carriers and load coils and put in remote terminals are largely associated with DSL. *Id. See also* JP Morgan and McKinsey & Company, *Broadband 2001: A Comprehensive Analysis of Demand, Supply, Economics and Industry Dynamics in the U.S. Broadband Market*, at 69 (Apr. 2001) ("*Broadband 2001*").

80 *Broadband 2001* at 68-74.

81 Comments of the Satellite Broadcasting and Communications Association/Satellite Industry Association Broadband and Internet Division, *Request for Comments on Deployment of Broadband Networks and Advanced Telecommunications Services*, NTIA Docket No. 011109273-1273-01; *Third Advanced Services Report*, ¶ 85.

82 *Third Advanced Services Report*, ¶ 85.

systems has been limited by line-of-sight challenges. However, companies now can deploy technologies that attempt to address these line-of-sight issues and, thus, have the potential to increase the availability of fixed wireless broadband to consumers.[84]

xDSL and cable modem services actively compete for customers.[85] These services have similar characteristics: both offer consumers an "always-on" connection, the ability to surf the Internet quickly and efficiently, fast access to services and features that require high bandwidth, and simultaneous use of the Internet and telephone. In addition, the deployment of xDSL tracks the deployment of cable broadband and *vice versa*.[86] Finally, cable and telephone companies

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(Continued . . .)

[83] *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, Sixth Report, 16 FCC Rcd 13350, 13452-53 (2001). Fixed wireless systems served 410,000 customers in 2001. Michael Pastore, *Fixed Wireless Remains Viable Broadband Option*, available at http://cyberatlas.internet.com/markets/broadband/article/0,1323,10099_752461,00.html.

[84] *Field Trial Results from 2nd Generation Broadband Fixed Wireless Equipment Featured at Shorecliff Communications' Broadband Wireless World Forum* (Jan. 24, 2002) available at http://www.bbwexchange.com/news/2002/shorecliff012202.htm; Margot Suydam, *Fixed: Broken?*, (Mar. 1, 2002) available at http://www.e-insite.net/index.asp?layout=article&articleId=CA198684&title=Search+Results&publication=e%2Dinsite&webzine=e%2Dinsite.

[85] *AOL Time Warner Order*, ¶ 65.

[86] The Commission previously noted that "the ILECs' aggressive deployment of DSL can be attributed in large part to the deployment of cable modem service. … The deployment of cable modem service [ ] spurred the ILECs to offer DSL or risk losing potential subscribers to cable. In various communities where cable modem service becomes available, the ILECs would soon deploy DSL service that was comparable in price and performance to the cable modem offering." *Broadband Today*, A Staff Report to William E. Kennard, at 27 (Oct., 1999) ("*Broadband Today*"). *See also* AT&T's and TCI Joint Reply To Comments And Joint Opposition To Petitions To Deny Or To Impose Conditions, CS Docket No. 98-178, at 35 (filed Nov. 13, 1998) ("*AT&T and TCI Reply Comments*").

view each other as competitors. For example, Comcast, AT&T and Cox have explicitly acknowledged that xDSL service competes with their cable broadband offerings,[87] and xDSL providers have implicitly acknowledged that cable modem service is the main competitor to their xDSL offerings.[88] In the aftermath of the Excite@Home bankruptcy, both cable broadband and xDSL providers courted former @Home customers.[89]

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[87] Time Warner Entertainment Company, L.P., *Annual Report on SEC Form 10-K*, at I-5 (filed Apr. 2, 2001) ("Time Warner Cable's systems face competition in its cable modem services from a variety of companies that service customers with various other forms of 'on-line' services, including DSL high-speed Internet access services …."); Reply Comments of AT&T Corp. and MediaOne Group, Inc., CS Docket No. 99-251, at 80 (filed Sept. 17, 1999) (noting that DSL services are "the most obvious competitors of broadband cable modem services"); *AT&T and TCI Reply Comments* ("Indeed, the xDSL services that are currently being deployed and offered by the incumbent LECs alone constitute a significant and attractive commercial alternative to the Internet cable services that TCI and others offer."); Cox High Speed Internet, http://www.cox.com/highspeedinternet/compare.asp (visited Apr. 1, 2002). The FCC has also acknowledged that xDSL service competes with cable broadband offerings. *See, e.g.*, Office of Plans and Policy, Federal Communications Commission, *Telecommunications @ The Millenium: The Telecom Act Turns Four*, at 5 (Feb. 8, 2000); *Application of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications Corporation to WorldCom, Inc*., Memorandum Opinion and Order, 13 FCC Rcd 18025, 18072-73 (1998) (considering how providers view the interchangeability of the products and considering how end users viewed the interchangeability of the product).

[88] In 2000, Pacific Bell instituted an advertising campaign touting the advantages of DSL over cable modem service. Excite@Home took issue with the tagline for the campaign—"Always fast. Never shared." Corey Grice, *Pac Bell Reworks DSL Ads After Cable Flare-Up* (May 3, 2000) available at http://news.com.com/2100-1033-240078.html. Similarly, Charter Communications, Inc. took issue with SBC advertisements depicting "drowsy kids up in the middle of the night to get speedy Internet access over their cable modem." Tim Bryant, *Judge Pulls Plug On Southwestern Bell DSL Ad Campaign*, St. Louis Post Dispatch (Oct. 17, 2001).

[89] Tom Spring, *Broadband Rivals Court @Home Users*, PC World.com (Dec. 7, 2001) available at http://www.pcworld.com/resource/pritnable/article/0,aid,74744,00.asp (noting that SBC "launched a marketing blitz" and that Verizon and Earthlink instituted special promotions intended to entice former @Home customers to their broadband service offerings); Gary H. Arlen, *Broadband Sector Is Fastest-Growing As Online Audience Climbs Back To 69.3 Million Amid Price, Service Overhauls*, TR's Online Census, at 5 (Feb. 2002) ("*TR's Online Census*").

The minimal regulation applied to cable modem service has enabled it to grow swiftly and gain a lead in the market. Fixed wireless and satellite broadband services also have minimal regulation and are poised to increase market share rapidly. Minimal regulation of xDSL service likely will have similar effects in promoting xDSL deployment.[90]

IV. REFRAINING FROM THE IMPOSITION OF UNBUNDLING FOR NEW, LAST-MILE BROADBAND INFRASTRUCTURE WILL PROMOTE ILEC DEPLOYMENT OF BROADBAND.

ILECs now face difficult decisions regarding whether to invest the billions of dollars in new fiber and broadband electronics necessary to enable them to offer broadband services to additional customers and to provide higher transmission speeds. While such investment likely would have positive effects on consumers and the economy, the Commission's Section 251 unbundling requirements—which reduce ILECs' valuation of their investments in broadband deployment and impose other implementation costs—discourage ILECs from investing.[91] This, in turn, has deleterious effects on intermodal competition. Therefore, HTBC recommends that the Commission refrain from applying Section 251 unbundling requirements to ILECs' new, last-mile broadband facilities.[92]

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[90] Congress recognizes that regulation can create undue economic burdens. One of the purposes of Title VI of the Communications Act is to "promote competition in cable communications and minimize unnecessary regulation that would impose an undue economic burden on cable systems." 47 U.S.C. § 521(6).

[91] The Commission itself recognizes "that substantial investment is required to build-out the networks that will support future broadband capabilities and applications. Therefore, our policy and regulatory framework will work to foster investment and innovation in these networks by limiting regulatory uncertainty and unnecessary or unduly burdensome regulatory costs." *See Wireline Broadband NPRM*, ¶ 5.

[92] See *supra* note 3, for HTBC's definition of "new, last-mile broadband facilities."

A. To Improve Current xDSL Service, ILECs Must Invest Billions Of Dollars In New Broadband Facilities.

ILECs have reached an inflection point with respect to their xDSL services. To get beyond the speed and distance limitations inherent in copper-based xDSL solutions, the ILECs and other companies need to invest billions of dollars in new fiber and broadband electronics.[93] For example, SBC anticipated that Project Pronto—which was intended to increase xDSL speed and quadruple SBC's broadband deployment—would require a $6 billion investment to lay more than 12,000 miles of fiber sheath, equip 1,400 central offices, and install or upgrade 25,000 neighborhood broadband gateways.[94] As initially envisioned, Project Pronto would have provided an estimated 80 percent, or approximately 77 million of SBC's customers, with minimum downstream speeds of 1.544 Mbps, and would have guaranteed 60 percent, or approximately 46 million of those customers, downstream speeds of 6.0 Mbps.[95]

Higher bandwidth will be even more costly. One study estimates that a "robust nationwide broadband network" would require investment of $35.2 billion annually for 7.7

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93 TechNet, *A National Imperative: Universal Availability of Broadband by 2010*, at 7,10 ("*TechNet Broadband Principles*"); *Haring-Rohlfs Study*, § 4. The required network enhancements are not necessarily limited to the last mile. As last-mile loading grows through increased broadband subscribership, higher bandwidth xDSL connections, faster computers, more data-intensive applications, or some combination of these factors, corresponding pressure will be brought to bear on other elements of the network including, eventually, the Internet backbone itself. This will result in the need for further equipment investment by operators.

94 *SBC Launches $6 Billion Initiative To Transform It Into America's Largest Single Broadband Provider*, News Release, SBC Communications, Inc., San Antonio, TX (Oct. 18, 1999) (*"SBC News Release"*).

95 *Id.*

years, including labor costs.[96] Other studies estimate that construction and deployment of a nationwide broadband network will cost between $270 and $300 billion.[97]

B. Section 251 Unbundling Requirements Discourage Broadband Investment.

1. Unbundling reduces the value of ILEC broadband investment.

Basic economic principles dictate that the imposition of Section 251 unbundling obligations on new, last-mile broadband facilities for the benefit of other carriers discourages ILEC investment in broadband deployment because it reduces the value of the ILECs' investment. Investing in new broadband deployment is an expensive and risky venture in any economic climate.[98] It requires technological innovation, an enormous amount of capital investment, and an ongoing commitment of financial and personnel resources in pursuit of an uncertain return on investment. The Commission acknowledges that "investments in facilities used to provide service to nascent markets are inherently more risky than investments in well established markets" and that "[c]ustomer demand for advanced services is also more difficult to predict accurately than is the demand for well established services."[99]

"A firm's decision to invest in facilities and innovative activity depends upon its weighing the probability of earning excess return from the investment against the risk of

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96 Stephen B. Pociask, *Building a Nationwide Broadband Network: Speeding Job Growth*, TeleNomic Research, LLC, at 5 (Feb. 25, 2002).

97 T. Randolph Beard, George S. Ford and Lawrence J. Spiwak, *Why ADCo?, Why Now?*, Phoenix Center Policy Paper Series, Number 12 (Nov. 2001); Gary Kim, *No Demise for DSL*, Fat Pipe (Aug. 2001) available at http://www.fatpipeonline.com/archives/aug2001dsl.asp.

98 *TechNet Broadband Principles* at 10; *Haring-Rohlfs Study*, § 6.

99 *UNE Remand Order*, 15 FCC Rcd at 3838.

investment loss."[100] In other words, risk and reward considerations determine the willingness of ILECs to invest new capital in broadband deployment. Chairman Powell has noted that "many questions [ ]remain as to what services consumers will value, and to what degree they will be willing to subscribe."[101] Requiring ILECs to share the rewards of broadband deployment (*i.e.*, to unbundle network elements used in the provision of broadband service) with carriers that incur none of the risks of investing in new, last-mile broadband facilities reduces the ILECs' expected return on investments and thus serves as a disincentive for ILEC investment in new or upgraded facilities.[102] Both economic literature[103] and the Commission's decisions[104] confirm that mandatory Section 251 unbundling may have a disincentive effect on investment.

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[100] Thomas M. Jorde, J. Gregory Sidak and David J. Teece, *Innovation, Investment, and Unbundling*, 17 Yale J. on Reg. 1, 7 (2000).

[101] "*Digital Broadband Migration*" *Part II*, Remarks of Michael K. Powell, Chairman, Federal Communications Commission (Oct. 23, 2001).

[102] *Haring-Rohlfs Study*, § 8.

Recent developments provide empirical evidence of the investment disincentives of Section 251 unbundling. Indeed, preliminary results of the Haring-Rohlfs study indicate that unbundling requirements render mass DSL deployment unprofitable for ILECs and probably will reduce DSL investment by at least $6 billion and possibly more than $20 billion.[105] Further, in a December 2001 letter to Chairman Powell, Corning indicated that, "[d]espite the progress made

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(Continued . . .)

[103] Phillip E. Areeda & Herbert Hovenkamp, *Antitrust Law: An Analysis Of Antitrust Principles And Their Application* ¶ 787'c, at 247 (Supp. 1999); 1 Harold Demsetz, *Ownership, Control, And The Firm*: *The Organization of Economic Activity* 207 (1988); *Bringing Home The Bits* at 150-151 ("[A]n unbundling obligation may deter an [ILEC] from pushing fiber farther into the neighborhood."); Jerry A. Hausman & J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, 109 Yale L.J. 417, 459 (1999) (noting that mandatory unbundling "decreases economic incentives for regulated telecommunications companies to offer innovative new services"); Jorde, *supra* note 100, at 5 ("Mandatory unbundling decreases an ILEC's incentive to invest in upgrading its existing facilities by reducing the ex ante payoffs of such investment."); Letter from Robert Crandall, George Gilder, Lawrence Kudlow, William A. Niskanen, Jeffrey A. Eisenach, Thomas W. Hazlett, James C. Miller III, and Alan Reynolds to The Honorable Donald L. Evans, The Honorable Glenn Hubbard, The Honorable Lawrence Lindsey, and The Honorable Paul H. O'Neill 2 (Dec. 4, 2001) (noting that mandatory unbundling reduces "the incentives of telecom companies to invest in new or modernized facilities, including those needed to provide affordable broadband services to homes and small businesses."); WorldBank (2000), World Telecommunications Regulation Handbook, Module 3 (acknowledging that unbundling "can enrich the new entrant at the expense of the incumbent operator").

[104] *Deployment of Wireline Services Offering Advanced Telecommunications Capability*, Memorandum Opinion and Order and Notice of Proposed Rulemaking, 13 FCC Rcd 24012, 24093 (1998). *See also Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations from Tele-Communications, Inc., Transferor To AT&T Corp., Transferee, Memorandum Opinion and Order*, 14 FCC Rcd 3160, 3204-05 (1999). Justice Breyer also recognizes this to be the case: "a sharing requirement may diminish the original owner's incentive to keep up or to improve the property by depriving the owner of the fruits of value-creating investment, research or labor." *AT&T v. Iowa Utils. Bd*., 525 U.S. 366, 428-429 (1999) (Breyer, J., concurring in part and dissenting in part).

[105] *Haring-Rohlfs Study*, §§ 8-10. *See also* Salomon Smith Barney, *supra* note 40, at 3.

in reducing the cost of the technology, fiber-based solutions are not being deployed in any significant volume" and that "the unbundling, resale and pricing regulations are discouraging investment."[106] In addition, both SBC and Verizon have cited the possible imposition of Section 251 unbundling requirements as a reason for their scaling back of broadband deployment.[107] In early 2001, SBC halted "further deployment and activation of new facilities in Illinois that would have made high-speed Internet access service available to over a million Illinois consumers beyond the 12,000 foot range of traditional DSL."[108] SBC cited the Illinois Commerce Commission's decision to require it to unbundle these new facilities, which would "cost hundreds of millions of dollars to implement" and "has made it economically impossible for SBC to recover the cost of deploying and operating the new DSL service in Illinois."[109] In late 2001, "faced with ever-increasing regulatory risk and uncertainty combined with a severe economic slowdown, SBC announced that it would reduce capital spending by 20 percent in

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106 Letter from Wendell P. Weeks, Corning Incorporated, to The Honorable Michael K. Powell, Chairman, Federal Communications Commission, at 2 (Dec. 5, 2001).

107 Qwest also has announced that it will not introduce DSL into any new markets within its territory. *TR's Online Census* at 5.

108 Letter from Ed E. Whitacre, Jr., Chairman and CEO, SBC Communications, Inc., to The Honorable J. Dennis Hastert, Speaker, U.S. House of Representatives, at 1 (Mar. 14, 2001).

109 *Id.*

2002 and scale back its original deployment schedule for Project Pronto."[110] Around the same time, Verizon indicated that uncertainty regarding the applicability of unbundling requirements for line cards in remote terminals "is one of the key reasons that Verizon to this point has significantly constrained deployment of DSL capability in our remote terminals."[111] According to Verizon, the current regulatory environment for wireline broadband service "magnifies the already substantial risk of investing in broadband technologies and services."[112]

2. Section 251 unbundling imposes additional implementation costs.

In addition to suppressing broadband investment incentives, Section 251 unbundling requirements deny ILECs the flexibility to design and deploy broadband facilities and services in an efficient manner. Verizon has stated that these obligations "inflate operational costs, force expensive network changes, and require costly new operations support system capabilities that are otherwise not needed."[113] For example, current unbundling rules require ILECs to deploy

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110 *SBC Outlines Comprehensive National Broadband Policy*, Press Release (Dec. 19, 2001) available at http://www.sbc.com/press_room/1,5932,31,00.html?query=20011219-1. SBC's Senior Vice President-Network Services has stated "[w]e can't go to our board of directors and make long-term investment decisions when we can't guarantee that we even have a chance to recover our cost of capital in the current regulatory environment." *On the Record …With Fiber on the Horizon, SBC Seeks New Approach to Policy*, Interview with Wayne Masters, Senior Vice President-Network Services for SBC, Telecommunications Reports (Feb. 11, 2002).

111 Letter from Thomas J. Tauke and Michael E. Glover, Verizon Communications, to Honorable Michael Powell, Chairman, Federal Communications Commission, at 4 (Nov. 6, 2001) (*"Verizon Letter to Chairman Powell"*).

112 *Verizon Letter to Chairman Powell* at 2.

113 *Id*.

larger than necessary remote terminals to accommodate potential demand for collocation.[114] SBC has spent $35 to $50 million to provide collocation space in its remote terminals; however, to date, no CLEC has taken advantage of this offering.[115]

3. Unbundling requirements could discourage cable, wireless, and satellite investment and innovation.

Mandatory Section 251 unbundling also can have a deleterious effect on intermodal competition in broadband deployment.[116] Because xDSL is a competitor to cable, wireless, and satellite broadband services, if ILECs do not invest in broadband deployment and innovative technologies, other broadband providers may have less incentive to make investments in their own technologies. For example, without competition from xDSL initiatives, such as Project Pronto, cable companies have fewer incentives to devote resources to creating higher bandwidth cable broadband services.

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[114] Comments of Qwest Communications International Inc., *Request for Comments on Deployment of Broadband Networks and Advanced Telecommunications Services*, NTIA Docket No. 011109273-1273-01, at 10 (filed Dec. 19, 2001); Comments of Verizon Communications, *Request for Comments on Deployment of Broadband Networks and Advanced Telecommunications Services*, NTIA Docket No. 011109273-1273-01, at 17 (filed Dec. 19, 2001).

[115] Patricia O'Connell, *SBC's Top Techie on Broadband Blues*, BusinessWeek Online (Mar. 13, 2002) http://www.businessweek.com/bwdaily/dnflash/mar2002/nf20020313_3059.htm.

[116] *Broadband Today*, at 33-34 (noting the argument made by cable interests that "the threat of regulation jeopardizes the incentives to make investments in alternative broadband technologies" and that "any disincentives that apply to cable are also applicable to telephone company DSL").

C. Removing Unbundling Obligations For New Facilities Would Provide ILECs With An Incentive To Invest In Broadband Facilities.

The *NPRM* seeks comment on whether the Commission should modify or limit incumbents' Section 251 unbundling obligations going forward "so as to encourage incumbents and others to invest in new construction."[117] In order to promote the deployment of broadband facilities by ILECs and other competitors, the Commission should refrain from imposing Section 251 unbundling obligations on new, last-mile broadband facilities.[118] The ILEC advantage is based on their legacy networks, which have been deployed over the last century. Broadband services, however, are provided using largely different electronics equipment and facilities than circuit-switched voice services; therefore, with respect to broadband, ILECs have no unfair competitive advantage based on their legacy networks. HTBC's approach would permit the Commission to maintain regulatory oversight over basic telephone service while removing some of the most intrusive old-technology rules for new-technology investment. It also would reduce the regulatory costs associated with ILEC deployment of current and successive generations of broadband capability, and lead to increased last-mile broadband investment. The growth of

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117 *NPRM*, ¶ 24.

118 See *supra* note 3, for HTBC's definition of "new, last-mile broadband facilities."

cable modem service in the United States is an excellent example of the market possibilities when Section 251 unbundling for new and innovative services is not required.[119]

V. THE TELECOMMUNICATIONS ACT OF 1996 COMPELS THAT ILECS' NEW, LAST-MILE BROADBAND FACILITIES BE FREE FROM UNBUNDLING OBLIGATIONS.

A. A New Regulatory Framework Is Necessary.

The Commission must adopt a new regulatory framework emphasizing consumer welfare, innovation, and minimal regulation.[120] At the time Congress passed the 1996 Act, the Internet was in its infancy and not an established medium for business, government, or personal use; however, since then the Internet has become a prominent feature of the communications landscape. Moreover, the aim of the Title II provisions of the Communications Act, as amended

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[119] In the cable context, numerous interests have noted that "the absence of regulation has been one of the principal factors contributing to the growth of cable modem deployment in the United States." *Broadband Today* at 33-34. *See also* Comments of Information Technology Industry Council, *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, Internet Over Cable Declaratory Ruling, Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, GN Docket No. 00-185, CS Docket No. 02-52 (filed Dec. 1, 2000) ("ITI believes that a broadband marketplace unencumbered by regulation will best produce competition and consumer choice in the broadband access market While enabling consumers to realize the full economic benefits of innovative information technologies."); Comments of the Telecommunications Industry Association, *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, Internet Over Cable Declaratory Ruling, Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, GN Docket No. 00-185, CS Docket No. 02-52, at 25 (filed Dec. 1, 2000) ("Cable operators have been investing heavily to upgrade the cable plant in order to provide residential high-speed Internet access and other services. These efforts have been undertaken outside the shadow of government-imposed open access regulation.").

[120] As Chairman Powell noted in a recent speech, "broadband should exist in a minimally regulated space. Substantial investment is required to build these networks and we should limit regulatory costs and uncertainty. We should vigilantly guard against regulatory creep of existing models into broadband, in order to encourage investment." *See* Remarks of Michael K. Powell, Chairman, Federal Communications Commission, National Summit on Broadband Deployment (Oct. 25, 2001).

by the 1996 Act, is to enhance consumer welfare by promoting competition in voice and other basic communications, historically a monopoly industry. Thus, extending legacy regulation to an ILEC's new broadband facilities is not required by statute and is inconsistent with sound public policy, given that ILECs are not incumbents in the broadband services market and that Congress did not contemplate such action when passing the 1996 Act.[121]

B. The Commission Should Refrain From Imposing Section 251 Unbundling Requirements On New Broadband Facilities On The Customer Side Of The Central Office.

The FCC should refrain from imposing Section 251 unbundling obligations with respect to new, last-mile broadband facilities. Specifically, HTBC proposes the following:

- ILECs should not be required to provide unbundled access to new, last-mile broadband facilities. Under this approach, unbundling obligations would not apply to the fiber, remote terminals, and DSL (and successor) electronics deployed on the customer side of the central office used to provide broadband services. Thus, ILECs would not be required to unbundle new broadband facilities, such as those deployed in SBC's Project Pronto.[122]

- ILECs should continue to be obligated to provide unbundled access to the legacy copper facilities to which CLECs have access today.

- ILECs should continue to be obligated to provide collocation space in their central offices at regulated, compensatory rates.

- ILECs desiring to retire legacy copper facilities should be permitted to do so after

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[121] *See TIA Section 706 Reply Comments* at 10 ("[A]s substantial and risky new investment in advanced telecommunications facilities is required, it is less clear whether *all* of the regulations applicable to the traditional voice-over-copper telephone network should apply to investment in new, last-mile broadband facilities.").

[122] Others have argued in support of similar deregulatory approaches. John Wohlstetter, *Fiber Fables II: The Long Distance Fiber Glut Is Last-Mile Copper Scarcity*, Bandwidth (Nov. 5, 2001) available at http://www.discovery.org/bandwidth/issues/2001-11-05.pdf ("[N]ew technology investment—notably, fiber placed in the local loop—should be exempted entirely from legacy asymmetric regulation."); Jorde, *supra* note 100, at 1, 7.

> entering into voluntary agreements with at least one unaffiliated CLEC for access to its broadband facilities and agreeing to make the access and rates set forth in the agreements available to other similarly situated CLECs.

The FCC also should consider various transitional measures that would permit ILECs to phase out use of copper loops in their networks such as allowing them to sell copper loops to CLECs at book value.

HTBC's proposed framework is consistent with the 1996 Act and will encourage ILEC investment in broadband facilities. ILEC investment in new, last-mile broadband facilities does not constitute a legacy advantage because any competitor could make a similar investment. Thus, these facilities should not be subject to Section 251 unbundling even if an ILEC uses them to provide traditional telephony services as well as broadband services because, under HTBC's proposal, competitive carriers will either have access to the legacy facilities required to provide telephony services or will have access to new facilities pursuant to a contractual arrangement with the ILEC.

HTBC's proposal also is consistent with both the FCC's and the National Telecommunications and Information Administration's ("NTIA") broadband policies.[123] In February 2002, the Commission laid out the following guidelines and policy goals with respect to broadband: (1) encouraging "the ubiquitous availability of broadband to all Americans;" (2) conceptualizing "broadband broadly to include any and all platforms capable of fusing

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[123] It is also consistent with the policy goals recently set forth by the European Union. Because the "new economy is here to stay," the European Union says, its "main priorities now are therefore to promote broadband Internet access (including the next-generation of mobile communications), content (as the 'average end-user is not interested in the delivery method, but in 'what' is delivered')." *See* EurActive.com, *Liikanen Says EU Should Promote Broadband Internet Access* (Jan. 21, 2002) *http://www.euractiv.com/cgi-bin/cgint.exe/331037-43?1100=1&204&OIDN=1502833&-home=search*.

communications power, computing power, high-bandwidth intensive content, and access to the Internet;" (3) allowing "broadband services [to] exist in a minimal regulatory environment that promote[s] investment and innovation in a competitive market;" and (4) developing "an analytical framework that is consistent, to the extent possible, across multiple platforms."[124] Nancy Victory, Assistant Secretary of Commerce for Communications and Information and Administrator of NTIA, also established guideposts for steering the formulation of the Administration's national broadband policy. NTIA policy calls for: (1) facilitating deployment of new technologies by eliminating any roadblocks; (2) promoting efficient facilities investment to gain the network reliability and security advantages of a diversity of facilities-based competitors; and (3) promoting competition in a technology-neutral way and being mindful that the market "might not always work as well or at the same pace in all areas."[125] HTBC's proposed framework meets both the Commission's and NTIA's stated guideposts and goals.

C. Section 251(d)(2) Requires That The FCC Refrain From Imposing Unbundling Requirements on ILEC New, Last-Mile Broadband Facilities.

While Section 251(c)(3) imposes a general duty to unbundle, Section 251(d)(2) limits this duty to avoid overbroad unbundling of an ILEC's network. Under Section 251(d)(2), the Commission may not compel unbundling of an ILEC's network elements until the Commission, at a minimum, determines that: (1) access to any proprietary elements is necessary; and (2)

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[124] *Wireline Broadband NPRM*, ¶¶ 3-6; *Cable Modem Service Declaratory Ruling and NPRM*, ¶¶ 4-6, 73.

[125] Assistant Secretary Nancy Victory, *Removing Roadblocks to Broadband Deployment*, National Telecommunications and Information Administration, speech to Competitive Policy Institute's Conference (Dec. 6, 2001).

failure to provide access to network elements impairs an entrant's ability to provide competitive services.[126]

The Supreme Court added meaning to the Act's unbundling provisions in its *AT&T v. Iowa Utilities Board* decision. First, the Court made clear that Section 251(d)(2) imposes "clear limits" on the FCC's power to compel unbundling of an ILEC's network elements.[127] Second, the Court prohibited the Commission from assuming that any increase in cost or decrease in quality impairs an entrant's ability to provide its desired services.[128] And, perhaps most importantly, the Court required the Commission to consider the "availability of elements outside of the incumbent's network."[129]

In response to the Court's directives, the Commission revised its earlier interpretations of "necessary" and "impair" in its *UNE Remand Order.* With regard to a proprietary network element, the Commission held that such element is "necessary" if lack of access to that element would *"preclud*e a requesting carrier from providing the services it seeks to offer."[130] The Commission defined "impair" as *"materially diminish*[ing] a requesting carrier's ability to provide the services it seeks to offer."[131] New ILEC broadband facilities do not satisfy this standard.

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126 47 U.S.C. § 251(d)(2).

127 *AT&T v. Iowa Utils. Bd.*, 525 U.S. 366, 397 (1999).

128 *Id.* at 389-91.

129 *Id*. at 389.

130 *UNE Remand Order*, 15 FCC Rcd at 3705.

131 *Id. See also* 47 C.F.R. §§ 251(d)(2), 251(d)(2)(b).

The Commission should look to consumer welfare as its guiding principle, rather than the economic welfare of competitive entrants.[132] In particular, the FCC should examine whether a particular action will result in higher prices, lower quality services, or less innovation.[133] As discussed above, current and future competition between intermodal broadband competitors benefits consumers while artificially mandated intramodal competition in the long run will not. In fact, attempts to foster intramodal competition by imposing Section 251 unbundling obligations will reduce the potential benefits of intermodal competition by deterring facilities-based investment and innovation that will make the broadband market even more competitive.

1. New, last-mile broadband facilities do not meet the Section 251(d)(2) "impair" standard for unbundling.

The Commission seeks comment on the deployment of cable, satellite, fixed wireless, and mobile wireless broadband facilities and asks whether it "should consider these intermodal providers as competitive alternatives to the incumbent's network."[134] As Justice Breyer explained in his *AT&T v. Iowa Utilities Board* concurrence, the Section 251(d)(2) standard "…requires a convincing explanation of why facilities should be shared where a new entrant

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132 Hausman and Sidak, *supra* note 103, at 454 (noting that "[t]he economic welfare of any single CLEC will not affect consumer welfare, because consumer welfare depends on the overall competitive supply of telecommunications service" and that "the Commission can determine whether competition will be impaired by analyzing whether prices for telecommunications services will be higher or quality (innovation) will be lower as a result of the agency's "necessary" and "impair" policy").

133 *Id.* at 450 ("[T]he correct meaning for 'impair' for purposes of § 251(d)(2) is whether the ILEC's failure to unbundle … a particular nonproprietary network element would produce an equilibrium supply of telecommunications services that would be, relative to the competitive equilibrium, significantly inferior for consumers. Here, 'inferior' can mean not only higher prices, but also lower quality services or less innovation in new [ ] services.").

134 *NPRM*, ¶ 28.

could compete effectively without the facility, or where practical alternatives to that facility are available."[135] Accordingly, consideration of intermodal competitive providers is essential to the unbundling analysis. Section 251 was intended to promote competition in a voice telephony market where ILECs have market power and where no competitive alternatives to ILECs' networks existed—Congress never intended to extend these Section 251 obligations to competitive markets. Through the 1996 Act generally—and Section 251 in particular—Congress intended to promote competition "in order to secure lower prices and higher quality services for American telecommunications customers."[136] Thus, the FCC should seek to advance consumer welfare and not to protect any particular competitor's interests.[137]

There have been significant competitive market changes since 1996,[138] resulting in a proliferation of broadband services over multiple and different electronic platforms.[139] Indeed, intermodal alternatives to ILECs' broadband facilities are thriving: cable modem services are leading the market, and satellite and terrestrial wireless services are growing.[140]

Since CLECs now have different platforms from which they may be able to provide their broadband services, a CLEC's ability to provide such services will not be "materially diminished" by a decision to exempt ILECs' new, last-mile broadband facilities from the

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135 *AT&T v. Iowa Util. Bd*. at 428 (J. Breyer, concurring).

136 1996 Act, Preamble.

137 Hausman and Sidak, *supra* note 103, at 450.

138 *NPRM*, ¶ 2.

139 *See Wireline Broadband NPRM*, ¶ 4.

140 *See generally Third Advanced Services Report*.

unbundling requirements of Section 251(c)(3). All carriers are in the same competitive position with respect to new build or total rehab facilities (*i.e.*, they must deploy and invest in new broadband facilities in order to provide high-speed access to the customer). Additionally, ILECs and CLECs have equal access to rights of way under Section 251(b)(4) and can obtain fiber from a multitude of manufacturers at competitive rates. Consequently, lack of access to an ILEC's new, last-mile broadband facilities does not impair an entrant's ability to provide broadband services. Thus, Section 251(d)(2) compels the FCC to remove unbundling obligations on these facilities.[141]

2. Even if the Commission believes impairment exists, the "at a minimum" statutory standard requires the Commission to consider other factors before mandating unbundling of new broadband facilities.

The FCC also asks "whether the 'at a minimum' language in Section 251(d)(2) can support a distinction between unbundling of facilities used for analog voice telephony and those used for advanced technologies."[142] It can, and it does. Even if impairment is found for a particular network element, Congress directed the Commission to consider other factors before determining that a network element should be unbundled.[143] Thus, as the Commission has

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141 The Commission has already concluded that the availability of competitive alternatives is a basis for denying unnecessary unbundling. For example, in the context of operator services and directory assistance, the Commission rejected arguments that "differences in cost and the amount of time required to implement services" required unbundling when services were already competitively available. *See Local Competition Provisions of the Telecommunications Act of* 1996, Third Report and Order and Fourth Notice of Proposed Rulemaking, CC Docket No. 96-98, FCC 99-238, ¶ 446 (rel. Nov. 5, 1999).

142 *NPRM*, ¶ 24.

143 47 U.S.C. § 251(d)(2).

properly stated, "an initial finding that a network element satisfies the 'necessary' or 'impair' standard does not automatically lead to the designation of a UNE."[144]

The Commission has a general obligation under Section 706(a) to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans …by utilizing, in a manner consistent with the public interest, convenience, and necessity," a variety of tools including "regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment."[145] For this reason, the Commission has good cause to ask whether it should modify or limit incumbents' unbundling obligations going forward "so as to encourage incumbents and others to invest in new construction."[146] Section 706(a) compels the FCC to refrain from imposing unbundling obligations, even if the "necessary" or "impair" standards are satisfied, if doing so would be inconsistent with the goals of the 1996 Act. Because the "greatest challenge in promoting broadband is deciding how to stimulate the enormous investment required to turn the promise into reality,"[147] the agency should give great

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144 *NPRM*, ¶ 21. In so stating, the Commission expressly referenced the "at a minimum" language of Section 251(d)(2).

145 1996 Act §706(a).

146 *NPRM*, ¶ 24. Further, the Commission requests comment on "whether and to what extent our unbundling analysis should expressly consider the Act's goal of encouraging the deployment of advanced telecommunications capability." *Id.*, ¶ 22.

147 Statement of Michael K. Powell, Chairman, Federal Communications Commission, in *Wireline Broadband NPRM* (Feb. 14, 2002) http://www.fcc.gov/Speeches/Powell/Statements/2002/stmkp202.html.

weight to the 1996 Act's goal of encouraging advanced services deployment in determining whether to impose unbundling requirements for new broadband facilities.

Given the current market forces, and the reality that ILECs have no unfair competitive advantage over their competitors based on their legacy networks in deploying new, last-mile broadband facilities, the 1996 Act provides the FCC with ample authority to determine that ILECs need not unbundle new broadband facilities deployed on the customer side of the central office as long as legacy copper loops and collocation remain available to competitors or voluntary unbundling of the new facilities has occurred. As the National Research Council recommends, "in the long term and in the case of investment in new facilities, policies should favor facilities-based competition over mandated unbundling."[148] Such an approach to unbundling: (1) reduces the need for persistent regulatory intervention; (2) permits competition-shaped broadband and industry structure; (3) promotes diversity; (4) avoids deterring competitors from investing in their own infrastructure; (5) removes a disincentive to new investment by incumbents; (6) avoids costs and organizational complications associated with coordination between incumbents and competitors; and (7) facilitates technical optimization of total bandwidth.[149]

In sum, the "at a minimum" language of Section 251(d)(2) compels the FCC to consider whether its unbundling rules promote the goals of the 1996 Act. The goals of the 1996 Act are—and the goals of the FCC should be—to develop unbundling polices that promote competition,

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148 *Bringing Home the Bits* at 27.

149 *Id.*

innovation, and consumer welfare, not the welfare of individual competitors.[150] Adoption of HTBC's proposal, which calls for deregulation of new, last-mile broadband facilities, will enable the Commission to foster competition by encouraging broadband deployment across multiple platforms, which, in turn, will help to achieve ubiquitous availability of broadband.

D. Pursuant To Section 10 Of The Communications Act, The Commission Must Forbear From Applying Section 251 Unbundling Obligations With Respect To ILECs' New, Last-Mile Broadband Facilities.

The Commission could forbear from applying the Section 251 unbundling requirements to broadband facilities under Section 10 of the Communications Act. In the 1996 Act, Congress added a new section—Section 10—to the Communications Act of 1934, which requires that the Commission forbear from regulation if it determines that competitive conditions no longer necessitate such regulation.[151] Section 10 provides that the Commission "shall forbear" from applying a regulation to a telecommunications carrier or telecommunications service if it determines that three criteria are met: (1) "enforcement of such regulation or provision is not necessary to ensure that the charges, practices, classifications, or regulations by, for, or in connection with that telecommunications carrier or telecommunications service are just and reasonable and are not unjustly or unreasonably discriminatory," (2) "enforcement of such

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150 Hausman and Sidak, *supra* note 103, at 450 (noting that "[t]he definitions of 'necessary' and 'impair' should seek to further overall competition and not merely the economic interests of individual competitors.").

151 *See* 1996 Act § 10(a); 47 U.S.C. § 160(a).

regulation or provisions is not necessary for the protection of consumers," and (3) "forbearance from applying such provision or regulation is consistent with the public interest."[152]

Forbearance from applying the Section 251 unbundling requirements to ILECs' new, last-mile broadband facilities meets all three of these criteria. Because different intermodal broadband competitors—cable modem, xDSL, satellite, and fixed wireless services—can offer broadband service over their own facilities, competition in the broadband market will foster reasonable rates and protect consumers. In addition, allowing full competition by several broadband technologies will promote the public interest by increasing deployment and marketplace choice and promoting market pricing.[153]

Upon finding that the three criteria discussed above are met, the Commission must consider whether forbearance will "promote competitive market conditions."[154] As discussed in Section III.B. above, application of the Section 251 unbundling requirements to ILECs' new, last-mile broadband facilities for the benefit of competing carriers discourages ILEC investment in these facilities and prevents ILECs from being more active competitors in the broadband market. Refraining from Section 251 unbundling obligations not only will remove investment

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152 *Id*.

153 A recent report issued by McKinsey and Company suggests that deregulation of new, last-mile broadband facilities will result "in intense competition which pushes down prices and forc[es] cooperation amongst operators, thereby creating a stronger economic platform for the development of new services." McKinsey and Company, *The Emergence of Broadband in Europe* (Nov. 13, 2001) http://www.euractiv.com/cgi-bin/cgint.exe/331037-43?1100=1&204&OIDN=250150&-home=search.

154 47 U.S.C. § 160(b).

disincentives but also will stimulate broadband deployment. Thus, forbearance under these circumstances will enhance competitive market conditions.

The limitations on the FCC's forbearance authority set forth in Section 10(d) do not apply with respect to broadband facilities. Section 10(d) requires that the Commission determine that the unbundled access requirements of Section 251(c)(3) have been "fully implemented" before forbearing from applying them.[155] In enacting the unbundled access requirements contained in Section 251(c)(3), Congress intended to ensure that new entrants could effectively compete against ILECs.[156] Section 251(c)(3) has been fully implemented because, as noted above, ILECs are subject to intermodal competition in the provision of broadband services. With multiple intermodal competitors, competitive conditions are such that the Act's goals are "fully implemented" and the Commission may forbear from applying the requirements of Section 251(c).[157]

In sum, Section 10 not only provides the Commission with authority to but also affirmatively requires that the Commission forbear from applying the unbundling requirements of Section 251(c)(3) to ILECs' new, last-mile broadband facilities.[158]

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155 47 U.S.C. § 160(d).

156 *AT&T Communications of New Jersey, Inc. v. Verizon New Jersey, Inc.*, 270 F.3d 162 (3d Cir. 2001).

157 47 U.S.C. § 160(d).

158 For essentially the same reasons, Section 10 provides the FCC with authority to forbear from applying the resale obligations set forth in Section 251(c)(4) to ILECs' new, last-mile broadband facilities. 47 U.S.C. § 251(c)(4).

VI. THE COMMISSION SHOULD NEGOTIATE DEPLOYMENT AND BANDWIDTH BENCHMARKS.

Benchmarks would serve the pro-deployment goals of the 1996 Act and provide compelling evidence that the Commission's elimination of the unbundling obligations on ILECs' new, last-mile broadband facilities would in fact promote broadband deployment. While HTBC supports a minimally regulatory broadband policy as outlined above, it must be combined with requirements that ILECs meet build-out requirements as to the percentage of customers served and the bandwidth speeds provided to those customers.

The Commission should formulate provider-specific benchmarks. Speed and percentage-coverage requirements should be developed in consultation with the ILECs, state regulatory bodies, consumer representatives, and others. These benchmarks should take into account current deployment of broadband facilities, geographic and demographic composition of ILEC service areas, and other relevant factors. Simply stated, the resulting deployment schedules should be aggressive, attainable, and economically rational from a business perspective.

Aggressive goals are attainable if the Commission refrains from imposing Section 251 unbundling obligations. For instance, while the appropriate benchmarks for each ILEC may vary, HTBC believes that the self-imposed benchmarks set by SBC with respect to Project Pronto provide a reasonable model.[159] SBC originally set a goal of "equipping 1,400 central offices with DSL technology, laying more than 12,000 miles of fiber sheath, installing and

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[159] Other examples of benchmarks can be found in recent legislation, such as *The Internet Freedom and Broadband Deployment Act of 2001,* H.R. 1542, and *The Broadband Deployment and Competition Enhancement Act of 2001,* S. 1126.

upgrading 25,000 neighborhood broadband gateways" in three years.[160] SBC envisioned that these actions would make DSL service with downstream transmission speeds of 1.5 Mbps available to more than 80 percent, or approximately 77 million, of its customers and DSL service with downstream transmission speeds of 6.0 Mbps available to more than 60 percent, or 46 million, of those customers.[161] By contrast, current deployment of DSL has reached only 43 percent of consumers, and typical transmission speeds are much lower.

Broadband facilities are not being deployed in a timely fashion because of outdated unbundling requirements. The Commission is compelled by Section 706 to remove these obstacles to deployment. At the same time, Section 706 requires the Commission to ensure that broadband is made available to all Americans on a timely basis. HTBC recommends that the FCC meet this obligation by requiring, under Section 201, that ILECs meet specific deployment benchmarks.

The Commission has taken similar action in the cable context. In the Cable Television Consumer Protection and Competition Act of 1992, Congress set forth a policy goal of ensuring that cable operators continued to expand the capacity and programs offered over their systems, where economically viable.[162] To achieve this policy goal, the FCC entered into "social contracts" with cable operators pursuant to which the cable operators agreed to upgrade their

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160 *SBC News Release*.

161 *Id.*

162 Cable Television Consumer Protection and Competition Act of 1992, § 2(b)(3), Pub. L. No. 102-385, 106 Stat. 1460 (1992).

facilities in exchange for the Commission not imposing regulatory burdens on their new services.[163]

Requiring ILECs to meet reasonable benchmarks will ensure that competition is extended to the next generation of broadband services and that consumers will quickly see the benefits future broadband applications can offer. Moreover, such benchmarks will enable broadband to reach its critical mass in a foreseeable and reliable manner, which in turn, will enable consumers to enjoy substantially increased benefits of broadband resulting from positive feedback.[164] This will lead to increased consumer demand for broadband services,[165] which will foster additional broadband content availability and increased value and uses of broadband technology. As these uses multiply, the value of broadband — through a multiplier effect — will far surpass monthly subscription prices.[166]

In sum, provider-specific benchmarks will speed the deployment of broadband technology, which in turn, will generate an important bandwagon effect sparking enormous demand and content development—all to the benefit of the U.S. residents and the national economy.

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[163] *Third Advanced Services Report* at n. 97; *Second Advanced Services Report*, 15 FCC Rcd at 20953, n. 126; *Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992: Rate Regulation and Adoption of a Uniform Accounting System for Provision of Regulated Cable Service*, Report and Order and Further Notice of Proposed Rulemaking, 9 FCC Rcd 4527, 4678 (1994).

[164] With positive feedback, broadband consumers obtain increased benefits resulting from additional consumers joining the broadband bandwagon.

[165] *Bandwagon Effects* at 56.

[166] *The $500 Billion Opportunity* at 17.

VII. CONCLUSION

For the reasons set forth above, the Commission should refrain from imposing Section 251 unbundling obligations on the ILECs' new, last-mile broadband facilities.

Respectfully submitted,

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STRATEGIC POLICY RESEARCH

THE DISINCENTIVES FOR BROADBAND DEPLOYMENT AFFORDED BY THE FCC'S UNBUNDLING POLICIES

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1. INTRODUCTION

The Federal Communications Commission's ("FCC's") unbundling policies have been criticized from many perspectives. Some of the criticisms are as follows:

a) By facilitating the leasing of facilities by competing local exchange carriers ("CLECs"), the policy affords disincentives for CLECs to make infrastructure investments. To the extent that CLECs respond to this disincentive, competition will be restricted to a limited portion of total value-added.

b) The policy provides no exit strategy for regulation. On the contrary, regulators will be needed for the indefinite future to police the pricing of a large set of unbundled network elements ("UNEs").

c) The policies tend toward an overall network design that increases costs and is vulnerable to quality-of-service problems. See, for example, Joseph H. Weber, "The Fragmentation of America's Telecommunications System."[2]

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[2] Available online at http://www.spri.com/pdf/reports/perspectives/perspectivesfragment2-26-02.pdf.

d) The FCC's total element long-run incremental cost ("TELRIC") costing standard has been criticized because prices are based not on incremental costs that might actually accrue, but on an artificial construct.[3]

e) The FCC's total reliance on bottom-up cost-estimation methods, with no real-world validation, is likely to underestimate costs.

All these criticisms may have merit. Nevertheless, we focus herein on yet another defect of the FCC's unbundling policies—a defect that has gotten less attention than the ones cited above but may have equally serious adverse consequences.

That defect revolves around uncertainty. Even if the FCC's unbundling policies worked well in markets with little risk, they are certain to work poorly where risks are large; e.g., in the current broadband market. The reason is that unbundling policies inherently diminish the upside potential of risky investments but do not afford comparable protection on the downside. They thereby substantially reduce the expected returns from such investments.

This phenomenon is a type of "real-option effect." Real options have been a topic of some interest by economists in recent years, and the underlying theory can be quite complex and mathematical.[4] Nevertheless, the basic principle is straightforward, as illustrated in the following example:

> Suppose that a hypothetical Federal Oil Commission ("FOC") imposed unbundling requirements on incumbent oil companies ("IOCs"). In particular, if an IOC drills a well, competing oil companies ("COCs") can get the oil by compensating the IOC for its drilling and operating costs (calculated according to a bottom-up cost model).
>
> In this example, COCs would, of course, be interested only in wells that struck oil. They would not pay any costs (TELRIC or otherwise) for holes turned out to be dry. Thus, IOCs would bear the entire loss from dry holes, while losing much of the compensating benefits from wells that strike oil.
>
> It is completely obvious that the unbundling requirements in this example vastly reduce the incentives of IOCs to drill for oil. The requirements would reduce incentives even if the FOC's costing methodology (unlike the FCC's) significantly *overestimated* the incumbent's costs.

[3] *See Whom the Gods Would Destroy, or How Not to Deregulate*, AEI Brookings Joint Center for Regulatory Studies, Washington, D.C., 2001, for a scathing criticism of this costing standard.

[4] *See, for example*, Lenos Trigeorgis, *Real Options: Managerial Flexibility and Strategy in Resource Allocation*, Cambridge, Massachusetts, 1996, and *see* A. K Dixit and R. S. Pindyck, *Investment under Uncertainty*, Princeton University Press, 1994.

The primary point of this paper is that the FCC's unbundling requirements afford disincentives similar to those of the FOC's policies in the example. In options terminology, the FCC, through its unbundling policies, has expropriated a valuable call option from the ILEC and bestowed it on CLECs. As a result, the CLECs, like holders of call options in general, get much of the upside potential of the ILEC's investments but do not bear the downside risk. The expected return of the ILEC's investment is reduced by precisely the value of this call option. In this way, unbundling requirements afford a strong investment disincentive for the ILEC.

Real options are actually a more modern and rigorous restatement of a concept advanced more than a half-century ago by Joseph Schumpeter. Schumpeter observed that, in order for firms to have an incentive to bear risks, they must have the prospect of earning supra-competitive profits if the venture turns out to be successful.[5] It follows that unbundling requirements which erode such profits also erode the incentives to make the risky investments in the first place. Thus, it can be said that unbundling requirements in risky markets are suspect from the perspective of both new and older accepted economic theory.

In general, unbundling requirements expropriate much of the upside potential of ILEC broadband investments. In addition, sub-loop unbundling requirements (i.e., requirements to offer portions of loops as UNEs) bestow a second type of real option on CLECs. In particular, CLECs are given the option to purchase sub-loop UNEs at TELRIC rates that usually do not include the cost of retrofitting remote terminals that were not designed for that purpose. That is, ILECs are required to construct at the remote terminal a point of interconnection ("POI") that is capable of accommodating CLECs' leasing of sub-loop UNEs. The costs of doing so are substantial, especially where space at the remote terminal, which may simply be a pedestal, is limited. The additional investment will be unproductive if CLECs choose not to exercise their option to lease the sub-loop UNEs. The return from deploying fiber to the remote terminal is thereby reduced by the value of the call option expropriated for CLECs.

Sub-loop unbundling requirements are all the more perverse, because (as discussed below) the use of sub-loop UNEs is unlikely to be cost-effective. Consequently, CLECs are unlikely to purchase substantial sub-loop UNEs, regardless of the evolution of broadband services. Thus, the primary effect of the sub-loop unbundling requirement is to needlessly increase ILEC costs.

We demonstrate herein that the investment disincentives afforded by the FCC's unbundling policies are serious and are likely to substantially reduce ILEC investments in broadband infrastructure. We are also undertaking empirical research that will provide a rough quantitative measure of these effects.

[5] *See* J. A. Schumpeter, *Capitalism, Socialism and Democracy* (New York: Harper & Row, 1942), 3rd ed, 1950, pp 81-106.

We will first estimate how much the unit costs of mass DSL deployment exceed current unit revenues. We will then evaluate whether future revenues are likely to be sufficiently large to make up for this short-term revenue shortfall.

We do not plan to estimate the upside profit potential *absent unbundling* for mass deployment of DSL. That potential is very large, but the (net present) values that will actually be realized are subject to great uncertainty. Nevertheless, we know that at least one large ILEC, namely SBC, placed a sufficiently high value on this upside potential to commit to mass DSL deployment through its Project Pronto.

We do plan to estimate the upside profit potential, after truncation through the FCC's expropriation of the real option. In particular, we propose to estimate the prices at which CLECs could profitably operate by purchasing UNEs and competing with ILECs to supply DSL service. For this purpose, we propose to use the Telcomp model that we previously developed and filed before the Commission.[6] The final step of our analysis will be to estimate the profits that ILECs could realistically expect to make, facing such competition from UNE-based CLECs.

We will additionally take account of the incremental costs of accommodating unbundling (while maintaining quality of service) at both the loop and sub-loop levels. These costs are additional offsets to the profitability of DSL deployment by ILECs.

Our preliminary analysis suggests that DSL's upside potential, after truncation by the FCC's unbundling requirements, cannot justify mass deployment of DSL. Consequently, SBC's withdrawal from Project Pronto can be interpreted as a rational response to the unbundling requirements. The bottom line is that the FCC's unbundling requirements have caused a substantial decline in DSL investment, to the detriment of the public.

2. CURRENT STATUS OF ILEC BROADBAND DEPLOYMENT

According to Cable Datacom News there were 7.2 million cable modem customers compared to 3.5 million DSL subscribers, in the U.S., at year end 2001. These data indicate that ILEC provision of DSL has become quite a significant business activity. Nevertheless, at the end of 2001, only approximately 3 percent of U.S. households had DSL.

Depending on one's perspective, one may regard the current pace of DSL deployment as fast or slow. G. Faulhaber has observed that the rate of growth has been more rapid than that of certain

[6] Strategic Policy Research, Inc., *Description of the TELCOMP© Model Version 1.4, and Results of its Application to the Atlanta LATA* (June 17, 1999). A working model of TELCOMP is available at http://www.spri.com.

other innovations in their early years; e.g., cellular service.[7] On the other hand, DSL growth has been much slower than that of cable-modem service, which is not subject to any unbundling requirements.[8]

3. DSL TECHNOLOGIES

DSL deployment to date has consisted largely of attaching DSL modems and DSL access multiplexers ("DSLAMs") on copper loops that can support DSL service. Various DSL technologies have evolved that can be used, depending on the capabilities of particular loops. These technologies include asymmetrical DSL ("ADSL"), high-speed DSL ("HDSL") and symmetrical DSL ("SDSL"). These are all characterized by different serving technologies, different data rates and different distance limitations. None of these services can operate on lines longer than 18,000 feet in the United States, since at this distance the lines typically contain loading coils that allow them to efficiently provide voice-band service. Loading coils are inductive devices that improve the ability of the line to carry low-frequency voice signals, but essentially eliminate the ability to carry the higher frequency DSL signals. Below 18,000 feet, achievable bandwidth increases as distance decreases, with about 12,000 feet generally considered the cutoff point for 1.5 Mbps service in one direction, the data rate necessary to support VHS quality television signals.[9] Furthermore, an increasing number of lines, some shorter than 12,000 feet, are being carried on subscriber line carrier ("SLC") systems for part of their length. Current SLC systems allow 64 kbps for each line and therefore cannot support DSL services without modification.

In addition to the issues of throughput for longer loops discussed above, other problems appear as deployment penetrations increase. One problem is the general non-uniformity of the loop plant. These wires, built to handle telephone conversations, and designed for easy rearrangement as customers connect and disconnect, contain numerous irregularities. Aside from the issues of splices (of which there are many) not being tight enough to provide solid low-resistance connections, and old wires that may have thin insulation in spots, there is the possibility of "bridge taps," extra sections of wire left on a line to facilitate easy reconnection later if necessary. Current practices often lead to reassignments of lines that are experiencing

[7] *See* Gerald R. Faulhaber, *Broadband Deployment: Is Policy in the Way?*, 2002.

[8] "Broadband Subscriber Base Doubles in 2001," *Cable Datacom News*, March 1, 2002 (www.cabledatacom-news.com/mar02/mar02-1.html).

[9] *See* Vassilios Mimis, *et al*, *Broadband Infrastructure (Services, Networks and Facilities)*, The National Broadband Task Force, Canada (http://broadband.gc.ca/English/resources/broad_infra.pdf) ADSL at 52; Computer Science and Telecommunications Board, National Research Council, "Broadband: Bringing Home the Bits," National Academy Press, at 125-129, and Appendix A, Broadband Technologies, pp. 259-262.

difficulties to other pairs of wires. This becomes more difficult to do as the DSL population expands. In addition, if too many DSL lines are placed on the same cable pair, it may be difficult to assign them to wires in a way that will avoid interference, or crosstalk, between services.

The combination of the line irregularities and the crosstalk potential makes it difficult to achieve the desired data rate, even on some lines that are shorter than the nominal maximum length for that data rate. Indeed, the history of DSL shows that getting the service running for a particular customer is often difficult.

As mentioned above, the maximum bandwidth is a function of many technical factors, but most importantly the length of the copper line that must be used. In order for the broadband market to achieve its potential, video programming of at least VHS quality must be supported. There seems to be little doubt that this data rate cannot be carried over DSL on lines longer than about 12,000 feet. Even this may be questionable in some circumstances. In any event, this limitation, taken together with the current design of SLC systems, excludes a large fraction, perhaps as much as 50 percent, of the residential market unless appropriately configured fiber facilities are used to extend the loops and reduce the length of copper wire.

For these reasons, DSL growth to date should not be regarded as the early adoption of a service that may ultimately serve the mass market; i.e., be capable of reaching (say) 80 percent of residences. On the contrary, adding DSL on copper lines that can support DSL is an activity that will top out long before reaching the mass market.

The bottom line is that DSL, as it is usually deployed today, has limited reach and capacity. It cannot serve the mass market. In the next section, we examine what must be done if the mass market is to be served.

4. EXPANSION TO THE MASS MARKET

The limitations described in the preceding section do not inhere in broadband services supplied by ILECs. On the contrary, ILECs could supply services of high bandwidth to the entire mass market. Doing so, however, would entail large fixed investments.

As mentioned above, supply of DSL service to the mass market requires a substantial upgrade of the current network. Currently, telephone loops containing more than about 12,000 feet of copper cannot reliably carry VHS-quality television signals to end users. In order to reach the mass market, fiber optic systems capable of carrying 1.5 Mbps for every line connecting to them would need to be deployed throughout the network. These systems would be placed in the so-called "feeder" sections of the network, allowing the portion of the loop between the wire center and the remote terminal to utilize fiber optic facilities. Thus, the length of the copper portion of the loop is shortened by the length of the fiber. There is no technical limit on the reach of the fiber. The choice of how much fiber to deploy is an economic one, driven by the configuration

of the particular wire center area. Although fiber cables have ample capacity to support the bandwidth, terminal equipment different from that now commonly used to support voice-grade lines needs to be deployed. As discussed above, a current SLC system is arranged to carry only 64 kbps for each copper wire it is connected to. This obviously is inadequate for 1.5 Mbps DSL services.

As discussed in detail below, transmission of video programming may turn out to be the single most valuable broadband application. If this application is to be supported, substantial additional investments must be made, over and above those of the transmission system itself.

In particular, since the DSL line can carry only a single video signal at a time, a video switch in the wire center is needed, as well as a broadband feed to the wire center from a "headend" carrying all the video programming to be distributed. The cable box at the customer's premises then must be able to initiate an upstream signal to select a channel for delivery over a particular line. If a large number of "movies on demand" are to be made available, it may be appropriate to archive these centrally, and dedicate 1.5 Mbps lines between the central archive and the wire center, where they can in turn be connected to the DSL line, for the duration of the movie. There may be other architectures for meeting this need, but none of them is simple and none of them is cheap.

According to Ken Twist of Ryan Hankins and Kent (discussing SBC's Project Pronto),

> [T]o deploy these services successfully, in all regions, SBC will have to upgrade their plant to handle burstable bandwidth, multicast (ATM and/or IP) to the edge, add headend servers, billing servers, OSS integration, etc. This entails more than simply re-selling a dumb pipe. Their network needs significantly more intelligence than it has. To do so will require significant capital investment.

All the investments required for DSL loops and systems, and video-distribution systems are largely irreversible. That is, most of the investment cannot be productively redeployed if the DSL market falls short of expectations. In particular, the ILEC will lose most of the value of its investments if demand for broadband services does not materialize or if the competitive battle is lost to other broadband suppliers.

More generally, all DSL investment over and above attaching DSL modems and DSLAMs to copper loops that can support DSL is risk capital. The ILEC making such investments has to be prepared to lose the productive value of virtually all this capital if things go badly. There needs to be substantial upside potential to counterbalance this risk.

In the next section, we examine the broadband applications whence cometh this upside potential.

5. BROADBAND APPLICATIONS

In this section, we examine what we believe are the four most important (generic) broadband applications that can be accommodated on DSL. They are: (1) transmitting large files; (2) advanced web pages; (3) downloading of music; and (4) downloading of video programming. Of special importance are the bandwagon effects associated with these applications.

5.1. TRANSMITTING LARGE FILES

An important benefit of broadband Internet access is to improve upon activities that already take place online. For example, email and the transmission of files (e.g., email attachments) is made easier through the use of broadband. Over a narrowband connection, the transmission of a large file can be a laborious task. Through the use of broadband, however, many files can be transferred in the time that it normally takes one file to be transferred over a narrowband connection.

Broadband connections can be especially useful in the transmission of large email attachments. In fact, broadband may allow email to evolve into a video, or audio based method of communication. As these files would be considerably larger than today's average email files, only broadband connections would allow them to be sent quickly and smoothly.

Nevertheless, for many Internet users, the value of these services does not justify the costs. DSL service is priced at approximately $47 per month.[10] To the average Internet user, this fee may seem too high for the added convenience. Time may be valuable, but it may not be valuable enough to justify the cost of DSL or cable-modem services for most Internet users.

5.2. ADVANCED WEB PAGES

Another advantage of broadband Internet access is the ability to access advanced websites, which often feature bandwidth-intensive features such as high-resolution graphics, animation, streaming audio, and active menus. Many businesses could utilize advanced websites to make their websites more attractive, informative, and easy to navigate.

Another feature of advanced web pages is streaming video; i.e., movie trailers, animation, news programs and product advertisements. Narrowband dial-up connections cannot accommodate streaming video very well. Video may appear jerky and slow. While some video may be tailored for narrowband access, it is of lesser quality and sophistication.

[10] McKinsey & Company and JPMorgan H&Q, *Broadband 2001: A Comprehensive Analysis of Demand, Supply, Economics, and Industry Dynamics in the U.S. Broadband Market* (New York, April 2, 2001), p. 72.

High-definition web pages are starting to be deployed, but they are not yet widely used. In particular, none of the Top 10 U.S. websites yet offer high-definition web pages.

The same point can be made about advanced web pages that we made about transmitting large files. The application certainly has value, but it is far from clear that it has *sufficient* value to the average user to justify the cost of broadband.

5.3. BANDWAGON EFFECTS

Bandwagon effects introduce additional uncertainty into the broadband market. Several important broadband applications are subject to bandwagon effects; i.e., the value of the application to a user depends on the number of broadband subscribers. Bandwagon applications include advanced web pages and several applications involving transmission of large files, e.g., photographs. As with many bandwagon products, there is a chicken-and-egg problem. In particular, applications suppliers (e.g., proprietors of web pages) are reluctant to use broadband, because so few consumers have broadband access. At the same time, users who would value such applications are not induced to get broadband Internet access, because so few applications are available. A similar chicken-and-egg problem exists for transmission of photographs. The demand for digital cameras is limited, because it takes so long for narrowband Internet users to receive photographs. At the same time, narrowband users do not have much incentive to upgrade to broadband to receive photographs, because so few persons have digital cameras.

It is possible that this chicken-and-egg problem will ultimately be solved, and broadband bandwagon applications will become commonplace. Conceivably, demand for broadband access will become subject to positive feedback, after these applications achieve critical mass.[11]

Nevertheless, the future of these applications involves considerable uncertainty. There is certainly no guarantee that critical mass will be achieved anytime soon.

5.4. DOWNLOADING OF MUSIC

The possibility of distributing music over the Internet offers the potential efficiency of the purchaser's being able to browse and sample from a huge selection of music from his/her home or office. This approach provides a very cost-effective means of distributing music purchases—it increases selection and convenience to the consumer and saves tremendously on overhead costs (e.g., store building, staff, etc.) to the seller. For this reason, downloading of digital music has the potential to become the preferred method of distributing pre-recorded music.

[11] *See* J. H. Rohlfs, *Bandwagon Effects in High-Technology Industries* (The MIT Press, 2001) for discussion of bandwagon effects; in particular, the chicken-and-egg problem, critical mass, and positive feedback.

Broadband access provides a much more convenient means of selling music via a download over the Internet than is possible with narrowband access. Music downloads are much quicker with broadband. One recent estimate is that a typical digital format MP3 music file takes 10 minutes to download with narrowband, but only one minute with broadband.[12] The inconvenience of narrowband is all the greater if the user wishes to download a larger quantity of music.

At present, however, copyright holders are reluctant to give permission for their music to be downloaded. The convenience and accessibility to music over the Internet threatens the copyright-holder's ability to monitor copies (and thereby collect royalties) on any copies made of the music. Furthermore, copyrights have historically been strongly defended. Prior to the advent of sharing facilities (and even prior to the advent of the Internet) the entertainment industry had been protective of its video and music products. Earlier technology and products such as audio and video tape recorders caused great apprehension among artists and copyright owners, who relied upon retail sales of their products and anticipated that copying their products would decrease sales. The music industry's experience with Napster has only heightened its concerns about unauthorized copying.

There is some movement toward a solution of the copyright problems associated with downloading music. Recently, a number of record companies, including Sony, AOL Time-Warner, EMI, and Bertelsmann, have begun, or announced plans to begin music download services. Nevertheless, further progress needs to be made before a broadband supplier could depend on being able profitably and legally to offer music for downloading.

Currently, it is difficult to protect copyrights while distributing music online. The digital format makes it extremely easy to copy and share individual songs. It also allows users to create their own CDs using writable CD drives. The music industry has recently devised a number of methods that would allow users to download songs, but prevent them from copying files to either a CD, a portable player, or to the hard drive of a peer. Unfortunately, such restrictions may dissuade potential users from using download services. Although the users would benefit from the savings in time and money, they also may feel the restrictions outweigh the benefits. Listeners enjoy being able to take their music with them. The restrictions may persuade music listeners to avoid digital music and continue to purchase music through traditional methods, or obtain music for free, peer-to-peer, over the Internet.

All in all, downloading of music is an application with great upside potential. It could generate substantial demand for broadband services, but the extent of demand is not known. We know from the experience of Napster that many users are willing to download a very large quantity of music if the price is zero. We do not know how much they would download, if they had to make a payment to copyright holders, as well as paying for broadband service.

[12] "European Telcos Take Lead Over Cable in Broadband Race," Dow Jones International News (1/5/2002).

5.5. DOWNLOADING OF VIDEO

Another application for which broadband access might be valuable is the downloading of video entertainment, particularly, movies. This application is very awkward using narrowband technology, because the downloading takes many hours. During the entire downloading period, the user's narrowband Internet channel is congested; so other Internet applications are degraded.

Some entertainment movies are beginning to become available. In the top 35 U.S. markets (i.e., largest metropolitan areas), MSN has worked with SBC, Verizon and Qwest to provide MSN Broadband service to make some movies available on-demand through the company *Intertainer*, owned by Microsoft, Sony, NBC and Intel. Users may access the *Intertainer* service through any ISP or cable operator.[13] But these activities are just getting started. As of now, relatively little video programming has been made available on the Internet.

In addition to limited availability of content, downloading of video programming faces potential copyright complications. The recent experience with Napster and users' downloading and swapping music files without copyright permission concerns the movie industry. Possible solutions to these concerns in the form of securing copyright protection are in the works. For example, this summer, five movie studios announced a joint venture to provide video-on-demand services over the Internet and encoded by Sony's "Moviefly" digital rights management technology.

Once video-on-demand services are finally established, they are bound to experience a great deal of competition from incumbent multi-channel video programming providers. Cable companies have already entrenched their services into most residential areas. They control a majority of the multi-channel video programming market, followed by the direct broadcast satellite industry. A new entrant, supplying video-on-demand service would provide competition in this market, much to the benefit of consumers. Nevertheless, a new entrant might find it difficult to compete with these incumbent multi-channel video programming suppliers, as they already have an established customer base. In addition, much of the cost of incumbent multi-channel video programming suppliers consists of sunk costs; so short-run marginal costs are very low. The incumbent suppliers could profitably offer very low prices rather than lose customers to a new broadband entrant.

We believe that downloading of video programming could potentially be an enormously profitable enterprise. On the other hand, many things must happen before this application can succeed: additional copyright problems must be solved, and the broadband supplier must meet serious competitive challenges from incumbent multi-channel video programming suppliers.

[13] Jefferson Graham, "Companies Finally Get Busy Selling Downloadable Vides-on-Demand," *USA Today* (November 12, 2001) at 6E.

6. THE BROADBAND MARKET IS POTENTIALLY QUITE LUCRATIVE BUT INVOLVES LARGE RISKS

The preceding discussion makes plain that ILEC broadband deployment has enormous upside potential. It could conceivably be the technological successor to the cable-television industry, videocassette rental stores, and record (CD and audio-tape) stores—in addition to speeding up and improving Internet access.

At the other extreme, broadband could be a commercial failure—at least for a long time into the future. The copyright problems for downloading video programming and music may not be satisfactorily solved. Even if they are solved, the hoped-for demands may fail to materialize for other reasons; e.g., consumer inertia, intensified competition by incumbent multi-channel video programming suppliers and/or the development of still newer technologies.

Meanwhile, if ILECs are to exploit this opportunity, they must make very large fixed investments before the extent of demand becomes known. The investments are largely irreversible and will be largely unproductive if demand does not materialize. The telephone plant of the ILECs is generally fixed in space. The loops, whether they are made of glass or copper, or some combination, are typically installed in ducts, in the ground, or (less frequently) on poles. They need to be pulled into place and spliced at frequent intervals. The terminal equipment is usually hard-wired into place at remote terminals. Furthermore, the cost of installing the equipment is usually a large part of the total cost of the facility. The cables, in particular, are not generally reusable in a different location (they would need to be cut and respliced—not an attractive idea). Salvage value is practically negligible. Thus, a large part of the investments will need to be written off if the broadband venture is not successful.

This situation is not at all uncommon in the high-technology world, which is not for the faint of heart. Players in this high-stakes game are required to put huge amounts of risk capital on the table. Success can lead to fabulous wealth, but many players lose their shirts.

7. WILLINGNESS OF ILECs TO BEAR THE RISKS

Some ILECs have indicated that, in the absence of unbundling requirements, they would be willing to put up the large amount of money required for a seat in this high-stakes game. In particular, in October 1999, SBC announced "Project Pronto," its ambitious plan "designed to transform SBC into a broadband service provider capable of meeting customers' needs for data, voice and video products" in its 13-state territory on an accelerated three-year schedule, at a cost of $6 billion.

One element of Project Pronto was the deployment of next-generation digital loop carrier ("NGDLC") at "neighborhood gateways" or remote terminals designed to eliminate loop length and network condition limitations on DSL and make high speed broadband services available to 80 percent of its residential customers.

In September 2000, SBC published a notice[14] providing a technical description and initial targeted sites for the ADSL capable neighborhood gateways and invited interested CLECs to contact SBC. The document defined the technology specifications: use single-mode fiber, support POTS and xDSL services, and support OC3 SONET transport between nodes. Separate, dedicated OC-3cs were planned for voice and data, with the data OC-3cs terminating on an Optical Concentration Device ("OCD") in the central office. Additionally, the OCD routes packetized data traffic to the appropriate ATM network. New element management systems would be deployed to manage these network elements, with flow-through provisioning of the OCD and RT for end-user service orders. During 2000 and early 2001, SBC launched several marketing initiatives to expand its DSL business. By January 2001, it had installed 2,000 residential gateways.[15]

Project Pronto was an event of great significance with respect to broadband. It had the potential to offer broadband Internet access and other broadband applications to the great majority of SBC's subscribers. Project Pronto goes beyond attaching DSL modems and DSLAMs to copper wire that can support DSL. It is a large first step in offering broadband services to the mass market, much of which cannot be served by attaching DSL modems and DSLAMs to existing copper wires.

A key point in assessing Project Pronto is that broadband investments, if unregulated, necessarily benefit consumers. As a result of such investments, consumers will have the option of purchasing broadband services, and some will choose to do so. Consumers benefit even if the investment does not recover the full amount of the ILEC's cost of capital, because in that case ILEC stockholders bear the loss. Conversely, consumers necessarily lose if unbundling requirements cause ILECs *not* to make the investment.

In summary:

> Broadband investments are a risk that may or may not pay off for ILECs. Public policies (such as unbundling requirements in risky markets) that cause such investments not to be made are sure losers, in the sense that they are certain to be detrimental to consumers.

[14] Project Pronto Notice, Issue 2.1, September 1, 2000.

[15] *See* Matt Stump, "Telcos' Dilemmas a Good Sign for Cable," *Broadband Week* (December 3, 2001).

8. NEGATIVE IMPACT ON ILEC BROADBAND INVESTMENT

ILEC investment in broadband has been substantially negatively affected by the FCC's unbundling policies.

8.1. SLOW-DOWN OF DSL DEPLOYMENT

There are strong indications that DSL may not grow nearly as rapidly in the future as it has in the past. According to Internetnews.com, three of the largest ILECs (Verizon, Qwest, and SBC) have "either abandoned DSL entirely or significantly slowed their deployment rate in their coverage areas."[16] On December 13 2001, Qwest announced that it planned to scale back the rollout of its high-speed data services. The company stated that it would now concentrate its efforts on expanding its DSL services in the areas where it is already available. Qwest did not expect to expand its service area into new regions. In other words, Qwest will focus on expanding its subscriber base, but will no longer lay new lines. Internetnews.com reported that Verizon has decided to scale back its DSL expansion plans. Instead the company will focus on retaining its current customers and improving customer service.[17] Finally, SBC also announced a slowdown in DSL expansion. As part of its Project Pronto plan, the company increased its DSL-capable locations to 25 million, allowing its coverage area to increase by 6.7 million customers.[18] Internetnews.com reports that Project Pronto has been "all but given up on."[19] This event is discussed in more detail below.

These developments can be easily understood in light of our findings in this study. As we discuss in detail below, current broadband applications justify only limited deployment of DSL. Any further DSL deployment must be justified, in large measure, by the prospect of supra-competitive returns on new broadband applications. Unfortunately, as we demonstrate in this study, those prospects are substantially diluted by the FCC's unbundling requirements.

8.2. THE DEMISE OF PROJECT PRONTO

In early 2001, SBC delayed by one year the target date for completion of its DSL deployment. In October 2001, two years after the original announcement of Project Pronto, SBC made the

[16] *Ibid.*

[17] Jim Wagner, "BellSouth: A DSL Success Story," downloaded from http://www.internetnews.com/isp-news/article/0,,8_948321,00.html (January 3, 2002).

[18] SBC Investor Briefing, "SBC Fourth-Quarter Diluted Earnings Per Share Increase 12.3% to $0.64 Versus $0.57 a Year Ago, Before One-Time Items," January 24, 2002.

[19] Jim Wagner, o*p. cit.*

following announcement—disheartening to those who hoped to see a rapid rollout of broadband technology.

> Since the announcement of Project Pronto, federal and 10 out of the 13 state regulators in SBC's territory have imposed or are considering additional unbundling and other requirements. In October 2001, faced with ever-increasing regulatory risk and uncertainty combined with a severe economic slowdown, SBC announced that it would reduce capital spending by 20% in 2002 and scale back its original deployment schedule for Project Pronto.[20]

Recently the Chief Technology Officer of SBC announced a shift in focus from DSL to passive optical networks ("PONs") and a massive scale down of Project Pronto due to "the headaches involved with Project Pronto and the cost and difficulty of managing active electronics in 40,000 'huts' or 'neighborhood gateways', all requiring remote power management."[21] Of course, SBC's willingness to endure these "headaches" is much reduced, given that the FCC's unbundling policies expropriate much of the upside potential of the investments.

The demise of Project Pronto is discussed further in Section 9, as it relates to sub-loop unbundling.

8.3. OTHER ILECS

SBC is not the only ILEC that has cut back its planned broadband investments, largely as a result of regulatory unbundling requirements. As discussed above, Verizon and Qwest have also scaled down their planned investments. These two ILECs, together with SBC, account for a substantial majority of access lines in the U.S. Thus, the overall impact is quite large.

A notable exception in this regard is BellSouth, which is continuing to rapidly expand its supply of DSL. BellSouth has long had a corporate policy of deploying fiber on loops over 12,000 feet, resulting in 4.3 million lines served by remote terminals, the highest percentage in the industry. Many of them are in rural areas (serving less than 100 customers each). Relative to other ILECs, BellSouth can more easily expand its supply of DSL without making additional fiber investments (but the SLC systems previously carried on existing fiber were not configured to support DSL services).

Nevertheless, BellSouth can be expected to encounter problems as it continues to expand its supply of DSL. Much of BellSouth's past DSL deployment has been accomplished by placing

[20] *SBC Communications Inc. Comments*, filed before the National Telecommunications and Information Administration ("NTIA"), U.S. Department of Commerce, *In the Matter of Deployment of Broadband Networks and Advanced Telecommunications Services*, Docket No. 011109273-1273-01, December 19, 2001.

[21] Ross Ireland, in keynote address at the IEEE Globecon Conference (November 26, 2001).

DSL equipment at remote terminals that have enough space for such equipment. To continue expanding its supply of DSL, BellSouth will have to utilize remote terminals that have less and less available space. Modern technology provides ways to deal with such space limitations. It does not, however, provide any cost-effective way to supply DSL *and* accommodate UNE-based CLECs at remote terminals with limited space.[22] Consequently, unbundling requirements will (if continued) have a negative impact on BellSouth's DSL investment, as well as that of the other ILECs.

9. REAL OPTIONS ASSOCIATED WITH SUB-LOOP UNBUNDLING

Although all unbundling requirements pose a profound disincentive to broadband investment, the requirement for sub-loop unbundling is especially onerous and counterproductive. The concept behind sub-loop unbundling is presumably that CLECs will bring their own facilities out to a remote terminal, where they will be able to somehow connect to the ILEC copper distribution facilities. If contrariwise, CLECs lease ILEC facilities to reach the remote terminal, sub-loop unbundling is simply an extraordinarily costly way to enable arbitrage.

Accommodating sub-loop unbundling is costly, because remote terminals are often little more than pedestals in residential neighborhoods. Because of space limitations, accommodating multiple carriers is physically quite difficult and consequently expensive.

In options terminology, ILEC provision of UNE points of interconnection at remote terminals conveys a call option on CLECs. CLECs can purchase sub-loop UNEs if the broadband market develops favorably but are not obligated to do so if the market develops unfavorably.

Unbundling requirements are even less defensible at the sub-loop level than at the loop level. It is quite possible, indeed likely, that CLECs will never demand many sub-loop UNEs—no matter how the broadband market evolves.

Nevertheless, CLECs, particularly those that also provide cable-modem service, have an incentive to insist that connections at remote terminals be made available to CLECs. Doing so raises the ILEC's cost of doing business, with little penalty to the CLEC, which would not in fact need to actually utilize the connection. (If the CLECs were required to make a bona fide request, they could do so, and then cancel, paying a modest penalty.) Sub-loop unbundling requirements

[22] *Comments of BellSouth Corporation*, filed before the NTIA, U.S. Department of Commerce, *In the Matter of Deployment of Broadband Networks and Advanced Telecommunications Services*, Docket No. 011109273-1273-01, December 19, 2001.

in this case are nothing more than a successful regulatory strategy by CLECs (and cable-modem suppliers) to raise rivals' costs.

Sub-loop unbundling requirements have been especially important in causing ILECs to scale back their plans for DSL deployment. SBC, in particular, cited two important examples where SBC earlier suspended its Project Pronto buildout in Illinois following a ruling by the Illinois Commerce Commission on sharing the remote terminals which makes the expansion too costly and maybe even impossible from an engineering standpoint.[23]

The bottom line is that sub-loop unbundling requirements substantially amplify the investment disincentives afforded by unbundling requirements in general.

10. QUANTIFYING THE NEGATIVE EFFECTS OF UNBUNDLING REQUIREMENTS

This section describes our methodology for quantifying the negative effects of unbundling requirements. It also states our preliminary results.

A recent study by McKinsey and J. P. Morgan estimated the average revenues and costs of mass DSL deployment by a large ILEC. Average revenues for 2002 are estimated to be $47 per customer per month, declining to $43 per customer per month in 2005. Cost is estimated to be $65 per customer per month in 2002, declining to $38 per customer per month in 2005. These costs do *not* include return to capital or income taxes. [24]

According to these estimates, mass DSL deployment is expected to earn a negative rate of return in 2002. The return will improve through 2005, but even then, as shown below, revenues will fall short of covering all costs, including the cost of capital. It follows that such DSL investments will earn large short-run losses, in the relevant economic sense.

Why, then, should ILECs make such investments in mass DSL deployment? Any positive answer to this question must rely on the expected future profitability of the investments. In particular, to justify such investments, ILECs would need to envision a reasonable chance for large profits, over and above the cost of capital. Such upside prospects are all the more necessary, when one considers that the DSL market, like many high-technology markets, faces

[23] Ann Keeton, "Ameritech Halts Buildout Of Pronto Broadband SBC In Ill.," Dow Jones News Service (March 7, 2001).

[24] McKinsey & Company and JPMorgan H&Q, *op. cit.*

the risk of turning south after a few years. For example, DSL might lose market share to new packet-based wireless services, as well as to cable-modem service.

Little, if any, gain in profits can be expected from further cost declines. The McKinsey-J.P. Morgan cost estimate of $38 per month in 2005 includes only $12 per month for depreciation. Remaining costs are primarily operating costs, which are not especially susceptible to reduction through technological progress. Moreover, cost reductions resulting from technological progress may be accompanied by lowering of the demand curve for DSL. DSL's main competitor, cable-modem service, benefits from similar technological progress, and its price may decline as its unit cost declines.

It follows that any substantial increase in profitability must derive primarily from increases in revenues per line. Such increases could, quite possibly, derive from the broadband applications, discussed above. Unfortunately, with the FCC's unbundling policies, ILECs can expect to enjoy only a small part of the potential gains from such broadband applications.

10.1. TELCOMP© MODEL

The TELCOMP© model was designed to evaluate the profitability of a CLEC that has its own switch but otherwise relies on UNEs to serve its customers. The results of the model were filed in 1999 and were based on actual UNE prices in Georgia at that time.

The model determined that a UNE-based CLEC could operate profitably (rate of return of 39 percent) supplying local services to the mass market. Higher rates of return (up to 114 percent) were, however, possible by:

- Supplying long-distance, as well as local, services; and
- Targeting high-revenue customers; in particular, all business customers and the upper three deciles of residential customers.

10.2. IMPLICATIONS FOR DSL

DSL can greatly improve the profitability of UNE-based CLECs. As shown in TELCOMP©, UNE-based CLECs can make ample profits on voice services alone. The addition of DSL service offers the potential of significant increases in profits. In particular, any scenario where DSL applications evolve favorably and lead to sizable ILEC profits is all the more favorable for UNE-based CLECs. Since UNE-based CLECs need not invest in infrastructure upgrades, their costs will be significantly less than the ILEC's.

If an ILEC has made the infrastructure investments necessary to serve the mass market, these incremental costs would be large. They would in some cases include investments in new fiber-optic cables and systems. In other cases, they would involve replacing carrier systems that are already in place. Additionally, the copper portion of the loop would in many cases need to be upgraded to support DSL at a speed of 1.5 Mbps. We estimate that the cost of these

infrastructure investments would average over $10 per month for loops that require infrastructure investments to support DSL at 1.5 Mbps and are longer than 12,000 feet.

The economics of ILEC mass deployment of DSL are illustrated in the two scenarios in Table 1:

Scenarios for Mass DSL Deployment: 2005		
($ per customer per month)	**Scenario 1**	**Scenario 2**
ILEC price, absent UNE-based CLEC competiton	43	66
ILEC cost, apart from cost of capital and income taxes	38	38
ILEC cost of debt*	3.6	3.6
ILEC cost of equity*	5.4	5.4
ILEC income taxes**	0.6	9.8
Total cost	47.6	56.8
ILEC profit, absent UNE based CLEC competition	**-4.6**	**9.2**
Cost of UNE-based CLEC (including cost of capital and income taxes)	NA	46.8
Price of UNE-based CLEC with profit of $10 per month	NA	56.8
* Calculated from McKinesy - J.P. Morgan estimates, assuming 6-year remaining depreciation life, debt-equity ratio of 1, 10 percent cost of debt, 15 percent cost of equity. ** Calculated assuming a 40-percent tax rate.		

Table 1

In Scenario 1, broadband applications do not develop, and the price is $43 per customer per month, as estimated by McKinsey-J. P. Morgan. In Scenario 2, successful broadband applications do develop, and the price is assumed to be $66 per customer per month, absent UNE-based CLEC competition.

In both scenarios, the cost, apart from cost of capital and income taxes, is $38 per customer per month. Also, in both scenarios, the cost of capital (debt plus equity) is estimated to be $9 per customer per month. Income taxes are estimated to be $0.60 per customer per month in Scenario 1 and $9.80 per customer per month in Scenario 2.

It follows that the ILEC's economic profits, absent UNE-based CLEC competition, are -$4.60 per customer per month in Scenario 1 and +$9.20 per customer per month in Scenario 2. Thus, the venture would be profitable for the ILEC, so long as the probabilities were at least one-third for Scenario 2 and not more than two-thirds for Scenario 1. The venture would therefore be attractive to an ILEC that was optimistic about the future of broadband applications.

Unfortunately, the economics become impossible, given the prospect of UNE-based CLEC competition. As illustrated in the table, such CLECs could undercut the ILEC's price by $9.20 per customer per month ($66 less $56.8) and still make a profit of $10 per customer per month—over and above the significantly positive profits that the UNE-based CLEC could make by supplying voice services alone. Obviously, the demand for the ILEC's DSL offering would be much reduced, given that a competitor has a very similar offering with a discount of $9.20 per customer per month. Consequently, the profitability of Scenario 2 is much reduced. It is reduced all the more when one considers that the ILEC loses over $10 per customer per month (the cost of unrecovered infrastructure investments) on the sale of DSL UNEs.

It follows that mass DSL deployment would definitely *not* be profitable in this example, unless the probability of Scenario 2 were far greater than one-third. Indeed, if the ILEC has to meet or beat the CLEC's price in order to attract customers, it cannot make positive profits, no matter how high the probability of success of broadband applications.

More generally, UNE-based CLECs can be expected to offer stiff competition long before ILEC profits reach a level that would provide reasonable compensation for the short-term losses that the ILEC previously incurred. As a result, the ILEC could not realistically expect to receive adequate compensation for those short-term losses. The only reason that such UNE-based competition would *not* appear is that the DSL market evolved unfavorably—in which case ILECs would absorb the losses alone.

For this reason, it is completely understandable that SBC withdrew from Project Pronto and other ILECs are scaling back their DSL investment programs. Indeed, one might ask why they did not wise up sooner. The answer is probably that the ILECs had confidence that the FCC would abandon its ill-conceived unbundling policies with respect to broadband services. From the standpoint of ILEC stockholders, any further substantial DSL investments would be hard to justify if the FCC, in this proceeding, affirmed its unbundling requirements for broadband services.

A lower bound on the investment that would be lost as a result of unbundling requirements is the $6 billion that SBC was willing to invest, absent such requirements. To obtain an upper-bound estimate, we would multiply this number by approximately three to include ILECs other than SBC. We would also need to consider investments that might be made if broadband applications turn out to be successful. The largest of these potential investments would be associated with provision of video entertainment services over DSL. All in all, the upper-bound estimate would be substantially in excess of $20 billion.

These investments, and the associated stimulation of economic activity will be largely forfeited unless the FCC abandons its counterproductive unbundling policies for broadband services.

11. CONCLUSIONS

There is currently a disconnect between putative regulatory objectives and the FCC's unbundling regime that has been adopted to implement those objectives. On the one hand, policy posits as its objective the stimulation of technological advance and innovation to promote enhanced economic productivity and growth; on the other hand, policy limits the rewards investors can rationally anticipate appropriating in the event of success and, thus, deters the necessary capital investment and risk-bearing by private enterprises.

Under the current regulatory regime, ILECs are required to unbundle network service elements and offer them for sale to CLECs at TELRIC-based prices, where there is a determination that unbundled-element supply is necessary and its absence would impair competition. Creation of new network service capabilities, in general, entails sunk/irreversible investments in physical, intellectual and human capital. The return on these investments is uncertain and difficult to anticipate in advance. The ILEC must make such investments before market uncertainties are resolved. The CLEC, on the other hand, can wait until the uncertainties are resolved before choosing whether to purchase UNEs.

The current regime thus affords CLECs with a valuable real option. By exercising that option in a particular circumstance, a CLEC can offload investment risk on the ILEC. The real option is analogous to a call option in financial markets. The CLEC can see whether the assets appreciate in value before deciding whether to purchase them at cost.

This one-sided regulatory policy is apparently an attempt to promote competition by bestowing the call option as a "free lunch" upon CLECs. The hope is that the CLEC will be encouraged to enter the market and expand its operations if it can eat lunch without paying for it. Given that the ILEC's DSL ventures are unregulated, ILEC ratepayers cannot be called upon to pay for the lunch, either.

The only catch—but in this case it turns out to be Catch 22—is that there is not really any free lunch. In this case, the value of the call option is expropriated, in an expected-value sense, from ILEC stockholders. The ILEC is expected to pay for lunch but not eat it.

The point of this paper is that ILECs, faced with the prospect of this expropriation, are likely to respond by not making the investment in the first place. The regulatory regime offers would-be ILEC investors very unattractive odds that no rational investor would voluntarily entertain.

The situation is summed up as follows by Malcolm Andrew, Senior Policy Advisor, Telecommunications Policy Branch, Industry Canada, in "Legislative and Regulatory Considerations Affecting Broadband Deployment," prepared for the National Broadband Task Force, March 2001. Mr. Andrew's comments focus precisely on the perverse real-option effects of the FCC's unbundling policies.

> Incumbent exchange carriers are required to offer rivals access to various 'unbundled' network service elements at rates that (it is, in our view, plausibly contended) fail to afford sufficient remuneration to make the needed capital investments economic. Moreover, the current rules, at least as heretofore interpreted by the FCC, require a variety of 'extreme' forms of service element unbundling that, while posing numerous technical difficulties and serious threats to service integrity, produce little by way of genuine operating advantage.
>
> The current regulatory regime thus offers incumbent telcos a 'coin flip' any rational economic actor would presumably prefer not to make: if their risky investments in new technology turn out to be an 'incomplete success,' they and their shareholders are left holding the proverbial bag; if the risky investments turn out to be a (complete!) success, the regulator's technology "sharing" rules rule out big rewards sufficient to warrant the requisite risk-taking in the first place. It is a clear case of 'heads, you lose' and 'tails you don't win,' so why bother?

Largely for the reasons outlined by Mr. Andrew, ILECs are sharply cutting back on their investments in DSL.

If ILECs do not make DSL investments in the first place, no one eats any lunch. The ILEC gets no benefit and falls further behind in the broadband contest with the increasingly dominant cable-television industry. CLECs cannot purchase UNEs, because the underlying ILEC facilities do not exist. Most importantly, the public also comes up empty. Telecommunications users reap none of the benefits that would be expected from ILEC broadband deployment. Also, the economy does not benefit from the stimulation that would result from ILEC investment.

More generally: Unbundling requirements in risky markets are counterproductive, because they expropriate a valuable real option from the investor. Their primary effect is likely to be a reduction in investment.